very old one. Sir Edward Coke employs it (*Coke upon Littleton*, lib. i. c. 1. sect. 1. p. 3. a.)":

"But no simile holds in everything; according to the ancient saying, *Nullum simile quatuor pedibus currit.*"

There is a marginal reference here to 1 Hen. VII. 16.

Perhaps some of your philological correspondents can throw some light on the origin of the phrase, or at least give me some other examples of its use. Is the expression "To be on all-fours with" good English? C. Mansfield Ingleby.

Richard, second Son of the Conqueror, is said by Hume, and by some minor writers after him, to have been killed by a stag in the New Forest; but William of Malmesbury and Roger of Wendover both say that he died of fever, consequent on malaria, which struck him while hunting there. This is well known to be of frequent occurrence in the neighbourhood of desolated human dwellings; and thus seems to involve even a more striking instance of retributive justice than the fate which Hume assigns to him. The fatality attending most of this name in our history is singular. Of nine princes (three of them kings) who have borne the name of Richard, seven, or, if Hume is right, eight, have died violent deaths, including four successive generations of the House of York. J. S. Warden.

Francis Walkinghame. — Your correspondent's mention of my *Arithmetical Books* (Vol. v., p. 392.) reminds me of a Query which I made in it, and which has never obtained the slightest answer — Who was Francis Walkinghame, and when was his work on arithmetic first published? The earliest edition I know of is the twenty-third, in 1787; but I am told, on good authority, that Mr. Douce had the sixteenth edition of 1779.

A. De Morgan.

Cocker and Walkinghame. — Can any correspondents of " N. & Q." furnish any particulars about these two celebrated computists ? I am not aware of two such eminent men of whom less is known. Indeed, I have never fallen in with any particulars at all regarding Walkinghame ; and any notice of Cocker is as meagre as may be.   METON.

[Some biographical notices of Cocker will be found in the *Penny Cyclopædia* ; Professor de Morgan's *Arithmetical Books*, p. 56. ; " N. & Q.," Vol. xi., p. 57. Walkinghame seems unknown. Professor de Morgan, in 1847, inquired after him. "I should be thankful to any one," he says, "who would tell me who Walkingame was, and when the first edition of *The Tutor's Assistant* was published." See "N. & Q.," Vol. v., p. 441., and Vol. xi., p. 57.]

game.   The Italians called it *sc...*
borrowed from the *schack* of the...
sway amongst them so long a ti...

As I am not aware whether...
supported by other authority,...
allow this Query to be inserted...
What is the earliest instance...
Sacorum designating our game...

Ear-piercing. — Will any of...
dents, medical or others, inform...
female relative who feels a r...
operation of having her ears...
there is any foundation for the...
that it has a beneficial effect o...

No. 300.]

THE
TUTOR's ASSISTANT:
BEING
A Compendium of ARITHMETIC;
AND
A Complete QUESTION-BOOK.

In FIVE PARTS.

CONTAINING,

I. *Arithmetic* in *whole Numbers*; being a brief Explanation of all its Rules, in a new and more concise Method than any hitherto published; with an Application to each Rule, consisting of a large Variety of Questions in real Business, with their Answers annexed.

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whole being adapted either as a QUESTION-BOOK for the Use of SCHOOLS, or as a REMEMBRANCER and INSTRUCTOR to such as have some Knowledge therein.

This Work having been perused by several Eminent MATHEMATICIANS *and* ACCOMPTANTS, *is recommended as the best* COMPENDIUM *hitherto published for the Use of Schools, as well as for private Persons.*

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By FRANCIS WALKINGAME,
Writing-Master and Accomptant.

LONDON:
Printed for the AUTHOR, and sold by W. REEVE at *Shakespear's* Head, opposite *Crane Court*, *Fleet-street*. 1752.

[PRICE TWO SHILLINGS.]

game.   The Italians called it *schacchi*, wh
borrowed from the *schack* of the Goths, v
sway amongst them so long a time.

As I am not aware whether this view
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What is the earliest instance of the te
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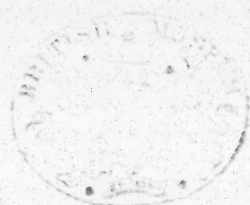## The SECOND EDITION.

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PREFACE.

THE Public, no doubt, will be furprized to find there is another Attempt made to publifh a Book of ARITHMETIC, when there are fuch Numbers already extant on the fame Subject, and feveral of them that have fo lately made their Appearance in the World; but I flatter myfelf, that the following Reafons which induced me to compile it, the Method, and the Concifenefs of the Rules, which are laid down in fo plain and familiar a Manner, will have fome Weight towards its having a favourable Reception.

Having fome Time ago drawn up a Set of Rules, and proper Queftions, with their Anfwers annexed, for the Ufe of my own School, and divided them into feveral Books, as well for the more Eafe of myfelf, as the readier Improvement of my Scholars, I found them, by Experience, of infinite Ufe; for when a Mafter takes upon him that laborious (tho' unneceffary) Method of writing

out

out the Rules and Questions in the Children's Books, he must either be toiling and slaving himself, after the Fatigue of the School is over, to get ready the Books for the next Day, or else must lose that Time which would be much better spent in instructing and opening the Minds of his Pupils. There was however still an Inconvenience which hindered them from giving me the Satisfaction I at first expected, *i. e.* where there are several Boys in a Class, some one or other must wait till the Boy who first has the Book finishes the writing out those Rules or Questions he wants, which detains the others from making that Progress they otherwise might, had they a proper Book of Rules and Examples for each ; to remedy which, I was prompted to compile one, in order to have it printed, as might not only be of Use to my own School, but to such others as would have their Scholars make a quick Progress. It will also be of great Use to such Gentlemen as have acquired some Knowledge of Numbers at School, to make them the more perfect ; likewise to such as have completed themselves therein, it will prove, after an impartial Perusal, on account of its great Variety and Brevity, a most agreeable and entertaining Exercise-Book. I shall not presume to say any thing more in favour of the Work, but beg Leave to refer the unprejudiced

judiced Reader to the Remark of a certain Author, concerning Compositions of this Nature : His Words are as follow :

" And now after all, it is poffible that
" fome who like beft to tread the old beaten
" Path, and to fweat at their Bufinefs, when
" they may do it with Pleafure, may ftart
" an Objection againft the Ufe of this well-
" intended ASSISTANT, becaufe the Courfe
" of ARITHMETIC is always the fame, and
" therefore fay, *That fome Boys lazily inclined,*
" *when they fee another at Work upon the*
" *fame Queftion, will be apt to make his Ope-*
" *ration pafs for their own.* But thefe little
" Forgeries are foon detected by the Dili-
" gence of the TUTOR : Therefore as diffe-
" rent Queftions to different Boys do not in
" the leaft promote their Improvement ; fo
" neither do the fame Queftions hinder it.
" Neither is it in the Power of any Mafter
" (in the Courfe of his Bufinefs) how full of
" Spirits foever he be to frame new Quefti-
" ons at Pleafure, in any Rule, but the fame
" Queftion will frequently occur in the fame
" Rule, notwithftanding his greateft Care
" and Skill to the contrary.

" It may alfo be further objected, *that to*
" *teach by a printed Book is an Argument*
" *of Ignorance and Incapacity* ; which is no
" lefs trifling than the former. He indeed
" (if any fuch there be) who is afraid his

b   " Scho-

" Scholars will improve too faſt, will un-
" doubtedly decry this Method : But that
" Maſter's Ignorance can never be brought
" in Queſtion, who can begin and end it
" readily, and moſt certainly that Scholar's
" Non-Improvement can be as little que-
" ſtioned, who makes a much greater
" Progreſs by this, than by the common
" Method".

To enter into a long Detail of every
Rule, would tire the Reader, and ſwell
the Preface to an unuſual Length ; therefore
ſhall only give a general Idea of the Me-
thod of Proceeding, and leave the reſt to
ſpeak for itſelf, which I hope the kind
Reader will find to anſwer the Title, and
the Recommendation given it. As to the
Rules, they follow in the ſame Manner as
the Table of Contents ſpecifies, and in much
the ſame Order as they are generally taught
in Schools. I have gone through the four
fundamental Rules in Integers firſt, before
thoſe of ſeveral Denominations, in order
that they being well underſtood, the latter
will be performed with much more Eaſe and
Diſpatch, according to the Rules ſhewn,
than by the cuſtomary Method of dotting.
In Multiplication I have ſhewn both the
Beauty and Uſe of that excellent Rule, in re-
ſolving moſt Queſtions that occur in Mer-
chandizing, and have prefixed before Reduc-
tion,

tion, feveral Bills of Parcels, which are applicable to real Bufinefs. In working Intereft by Decimals, have added Tables to the Rules, for the readier calculating Annuities and Penfions in Arrears, Prefent Worth of Annuities, &c. and have not only fhewn the Ufe, but the Method of making them; and I may venture to fay, I have gone through the Whole with fo much Plainnefs and Perfpicuity, that there is none now extant that is better.

I have nothing further to add, but to beg of every candid and judicious Reader, that if he fhould by Chance find a Tranfpofition of a Letter, or a falfe Figure, to excufe it; for notwithftanding there has been great Care taken in correcting, yet Errors of the Prefs will inevitably creep in, and fome may alfo have flipped my Obfervation : In either of which Cafes, the kind Admonitions of a good natured Reader will be very acceptable.

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ARITHMETIC in WHOLE NUMB[ERS]

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DECIMALS.

PART IV.
DUODECIMALS.

PART V.
QUESTIONS.

Ex-

Left partial page (previous page, bleeding through):

Explanation *of the* Characters ...
use of in this COMPENDIU...

= E^{QUAL}. The Sign of Equality; as, 4 *qr*...
fignifies, that 4 *qrs.* are equa...

— *Minus or leſs.* The Sign of Subtraction; as, ...
that is 8 leſſened by 2 is equal ...

+ *Plus or more.* The Sign of Addition; as, 4...
that is 4 add 4 more, is equal t...

× *Into or with.* The Sign of Multiplication; as...
24, that is, 4 multiplied into ...
| to 24.

÷ *By.* The Sign of Diviſion; as, 8...
that is, 8 divided by 2 is equa...

$\dfrac{2375}{63}$ Numbers placed like a Fraction...
wiſe denote Diviſion, the uppe...
being the Dividend, and the ...
Diviſor.

:: *So is.* The Sign of Proportion; as, 2 : ...
that is, as 2 is to 4, ſo is 8 to 1...

7 − 2 + 5 = 10. Shews that the Difference betw...
7 added to 5, is equal to 10.

$9 - \overline{2 + 5} = 2.$ Signifies, that the Sum of ...
taken from 9, is equal to 2.

√ Prefix'd to any Number, fig...
Square Root of that Number is r...

√³ Signifies the Cube, or third Pow...

√⁴ Denotes the Biquadrate, or 4th Po...

racters *made*

ENDIUM.

; as, 4 *qrs.* = 1 *cwt.*
are equal to 1 *cwt.*

ion ; as, 8—2=6,
is equal to 6.

n ; as, 4 + 4 = 8,
is equal to 8.

ation ; as, 4 × 6 =
lied into 6, is equal

on ; as, 8 ÷ 2 = 4,
2 is equal to 4.

a Fraction, do like-
the upper Number
and the lower the

n ; as, 2 : 4 :: 8 : 16,
o is 8 to 16.

rence between 2 and
al to 10.

Sum of 2 and 5
l to 2.

umber, signifies the
umber is required.

third Power.

e, or 4th Power, &c.

THE

THE
TUTOR's ASSISTANT,
BEING
A Compendium of Arithmetic.

PART I.

Arithmetic in whole Numbers.

The INTRODUCTION.

ARITHMETIC is the Art or Science of computing by Numbers, and confifts both in Theory and Practice.

The Theory confiders the Nature and Quality of Numbers, and demonftrates the Reafon of practical Operations.

The Practic is that which fhews the Method of working by Numbers, fo as to be the moft ufeful and expeditious for Bufinefs, and has five principal or fundamental Rules for the Operations ; *Viz.*

NOTATION or NUMERATION, ADDITION, SUBTRACTION, MULTIPLICATION, and DIVISION.

NUMERATION

TEACHETH the different Value of Figures by their different Places, and to read and write any Sum or Number.

B

The

The TABLE.

9 C Millions.	8 X Millions.	7 Millions.	6 C Thousands.	5 X Thousands.	4 Thousands.	3 Hundreds.	2 Tens.	1 Units.
9	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0
		7	0	0	0	0	0	0
			6	0	0	0	0	0
				5	0	0	0	0
					4	0	0	0
						3	0	0
							2	0
								1

Notation by Roman *Letters.*

I One.	XXX Thirty.
II Two.	XL Forty.
III Three.	L Fifty.
IV Four.	LX Sixty.
V Five.	LXX Seventy.
VI Six.	LXXX Eighty.
VII Seven.	XC Ninety.
VIII Eight.	C Hundred.
IX Nine.	CC Two Hundred
X Ten.	CCC Three Hund
XI Eleven.	CCCC Four Hun
XII Twelve.	D Five Hundred.
XIII Thirteen.	DC Six Hundred.
XIV Fourteen.	DCC Seven Hund
XV Fifteen.	DCCC Eight Hur
XVI Sixteen.	DCCCC Nine Hu
XVII Seventeen.	M One Thousand
XVIII Eighteen.	MDCCL One
XIX Nineteen.	Seven Hundred
XX Twenty.	

RULE. There are three Periods; the Firſt on the Right-hand Units, the Second Thouſands, and the Third Millions; each conſiſting of three Figures, or Places. Reckon the firſt Figure of each from the Left-hand as ſo many Hundreds; the next as Tens, and the Third as ſo many ſingle ones of what is wrote over them: As the firſt Period on the Left-hand is read thus, Nine hundred eighty-ſeven Millions; and ſo on for any of the reſt.

The APPLICATION.

Write down in proper Figures the following Numbers:
Twenty-three.
Two Hundred and Fifty-four.
Three Thouſand, two Hundred and Four.
Twenty-five Thouſand, eight Hundred Fifty-ſix.
One hundred thirty-two Thouſand, two Hundred Forty-five.
Four Millions, nine hundred forty-one Thouſand, four Hundred.
Twenty-ſeven Millions, one hundred fifty-ſeven Thouſand, eight Hundred Thirty-two.
Seven hundred twenty-two Millions, two hundred thirty-one Thouſand, five Hundred and Four.
Six hundred two Millions, two hundred ten Thouſand, five Hundred.

INTEGERS.

ADDITION

TEACHETH to add two or more Sums together, to make one whole or total Sum.

RULE. There muſt be due Regard had in placing your Figures one under the other, *i. e.* Units under Units, Tens under Tens, &c. then beginning with the firſt Row of Units, add them up to the Top; when done, ſet down the Units, and carry the Tens to the next, and ſo on, continuing to the laſt Row, at which ſet down the total Amount.

PROOF. Begin at the Top of the Sum, and
the Figures downwards, the same as you added t
and, if the same as the First, the Sum is suppo
right.

£.	Cwt.	Qus.	Months.	£.	Years
2	27	275	1234	7524	2710
5	35	110	7098	3750	3254
7	47	473	3214	9147	1073
9	35	354	6732	3214	6259
2	41	271	2546	4725	7540
5	36	352	3709	2147	2797
4	59	471	4152	3254	8542
3	37	310	3705	2716	1270
7	14	473	1076	1047	1047
44	331				

SUBTRACTION

TEACHETH to take a lesser Number
greater, and shews the Remainder, or Dif
RULE. This being the Reverse of Addition, y
borrow here (if it requires) what you stopped a
always remembring to pay it to the next.

PROOF. Add the Remainder and lesser Line t
and, if the same as the greater, it is right.

	£.	Hund.	Hours.	Weeks.	Hogds.	
From	271	3754	42087	452705	271508	
Take	154	2725	35096	327616	152471	
Rem.	117					
Proof.	271					

MULTIPLICATION

TEACHES how to increase the greater
Numbers given, as often as there are Unit
lesser; and compendiously performs the Office o
Additions.

To this Rule belongs three principal Members, *viz.*

1. The Multiplicand, or Number to be multiplied.
2. The Multiplier, or Number by which you multiply.
3. The Product, or Number produced by multiplying.

RULE. Begin with that Figure that stands in the Unit's Place of the Multiplier, and with it multiply the first Figure in the Unit's Place of the Multiplicand. Set down the Units, and carry the Tens in Mind, till you have multiplied the next Figure in the Multiplicand by the same Figure in the Multiplier; to the Product of which add the Tens you kept in Mind, setting down the Units, and proceed as before, till the whole Line is multiplied.

PROOF. The usual Way of proving Multiplication is, by casting out the Nines from the Multiplicand and Multiplier; the Remainders put on each Side of a Cross: Multiply the Figures on each Side together, cast the Nines from the Product, and put the Overplus at Top; then cast out the Nines from the Product of the Multiplication, and its Remainder place at the Bottom; and, if it agrees with the Top, the Work is supposed right. But the surest Way is, to divide the Product by the Multiplicand, and the Quotient will be the same as the Multiplier.

MULTIPLICATION *and* DIVISION TABLE.

1 2	3	4	5	6	7	8	9	10	11	12
2 4	6	8	10	12	14	16	18	20	22	24
3 6	9	12	15	18	21	24	27	30	33	36
4 8	12	16	20	24	28	32	36	40	44	48
5 10	15	20	25	30	35	40	45	50	55	60
6 12	18	24	30	36	42	48	54	60	66	72
7 14	21	28	35	42	49	56	63	70	77	84
8 16	24	32	40	48	56	64	72	80	88	96
9 18	27	36	45	54	63	72	81	90	99	108

Multiplicand	25104736	52471021	7925437521
Multiplier	2	3	4
Product	50209472	157413063	
			27104107

B 3

| 27104107 | 321047 | 7092516 | 3725104 |
5	6	7	8

| 3215406 | 2701047 | 31040871 | 35210472 |
9	11	12	12

When the Multiplier confifts of feveral Figures, there muft be as many Products as there are Figures in the Multiplier, obferving to put the firft Figure of every Product under that Figure you multiplied by. Add the feveral Products together, and their Sum will be the total Product.

| 271041 | 32104 | 2710432 | 27501976 |
27	25	375	2710
1897287	802600	1016412000	74530354960
542082			
7318107	271047	7092851	
	32104	37154	
	8701692888	263527786054	

| 2705197 | 270514 | 2701721 |
207519	370056	3010079
561379776243	100105328784	8132393645959

| 123456789 | 987654321 |
987654321	123456789
12193263112635269	12193263112635269

When there are Cyphers at the End of the Multiplicand or Multiplier, they may be omitted, by only multiplying by the reft of the Figures, and fetting down on the Right-hand of the total Product, as many Cyphers as were omitted.

27100	379500	265000	574000
52600	274000	7200	630

1425460000	103983000000	1908000000	361620000

DIVISION

TEACHETH us to find how often one Number is contained in another; or to divide any Number into what Parts you please.

In this Rule there are three Numbers real, and a fourth accidental, *viz.*

1. The Dividend, or Number to be divided.

2. The Divisor, or Number by which you divide.

3. The Quotient, or Number that shews how often the Divisor is contained in the Dividend.

4th, or accidental Number, is what remains when the Work is finished, and is of the same Name as the Dividend.

RULE. When the Divisor is less than 12, seek how often it is contained in the first Figure in the Dividend; set it down under the Figure you divided, and carry the Overplus (if any) to the next in the Dividend, as so many Tens; then seek how often the Divisor is contained therein, set it down, and continue the same, till you have gone through the Line. But when the Divisor is more than 12, multiply it by the Quotient Figure; the Product subtract from the Dividend, and to the Remainder bring down the next Figure in the Dividend, and proceed as before, till the Figures are all brought down.

PROOF. Multiply the Divisor and Quotient together, adding the Remainder (if any) and the Product will be the same as the Dividend.

	Dividend Rem.		
Divisor	2)725107(1	3)7210472(	4)7210416(
Quotient	362553		
	2	5)7203287(	6)5231047(
Proof	725107		

7)

7)2532701(8)2547325(9)25047306(

———   ———   ———

11)2750912(12)2710513(12)72104732(

———   ———   ———

Divisor	Dividend	Quotient

27)3210473(118906   35)7210473(206013
  27   27

  ——   ——   473)2104721(4449

  51   832342   275)3720147(13527
  27   237812
  ——   11   3701)72109521(19483

  240   ——   3576)72104725(19482
  216   3210473 *Proof*
                              2510)63210476(20163
  ——
  244   25204)321047217(12737
  243
                              31709)521047321(16432

    173   725014)72527103521(100035
    162
    ——   2701234)7210472532(2669

Rem. 11   210472)352107193214(1672940

                3721071)21071921473(5662

When there are Cyphers at the End of the Divisor, they
may be cut off, and as many Places off of the Dividend,
but must be annexed to the Remainder at last.

271|00)254732|21(939   5721|00)7253472|16(1267

375|000)752473|719(2006   215|000)6325104|997(29419

TABLES *of* MONEY, WEIGHTS, *and* MEASURES.

MONEY.

Marked.				Marked:
¼ *Farthing.*	4 Farthings, make	1 Penny.		*d.*
½ *Halfpenny.*	12 Pence,	1 Shilling.		*s.*
¾ *Three Farth.*	20 Shillings,	1 Pound.		*l.*

TROY

TROY WEIGHT.

			Marked.
24 Grains, make	1 Pennyweight.	{	grs. dwts.
20 Pennyweights,	1 Ounce.		oz.
12 Ounces,	1 Pound.		lb.

By this Weight are weighed **Gold, Silver, Jewels, Elec-tuaries, Bread and all Liquors.**

N. B. The Standard for Gold Coin is 22 Carats of fine Gold, and two Carats of Copper melted together. For Silver, is 11 *oz.* 2 *dwts.* of fine Silver, and 18 *dwts.* of Copper.

25 *lb.* is a Quarter of an *cwt.* 100 *lb.* 1 *cwt.* 20 *cwt.* 1 Ton of Gold or Silver.

AVOIRDUPOISE WEIGHT.

			Marked.
16 Drams make	1 Ounce.	{	dr. oz.
16 Ounces,	1 Pound.		lb.
28 Pounds,	1 Quarter.		qrs.
4 Quarters, or 112 *lb.*	1 Hundred Weight.		cwt.
20 Hundred Weight,	1 Ton		Ton.

There are several other Denominations in this Weight, that are used in some particular Goods, *viz.*

	lb.		*lb.*
A Firkin of Butter,	56	A Gallon of Train Oil,	7½
Soap,	64	A Truss of Straw,	36
A Barrel of Anchovies,	30	new Hay,	60
Soap,	256	old Hay,	56
Raisins,	112	36 Trusses a Load.	
A Puncheon of Prunes,	1120		
A Fother of Lead,	19 *cwt.*	*Cheese and Butter.*	
2 *qrs.*		A Clove, or Half Stone,	8
A Stone of Iron Shot, } *lb.*		A Wey in Suffolk, 32 } 256	
or Horseman's wt. }	14	Cloves, or	
Butchers Meat,	8	A Wey in Essex, 42, or 336	
		Wool.	

	lb.		*lb.*
Wool.		A Wey is 6 Tod and } 182	
A Clove,	7	1 Stone, or	
A Stone,	14	A Sack is 2 Weys, or	364
A Tod,	28	A Laſt is 12 Sacks, or	4368

By this Weight is weighed any thing of a coarſe or droſſy Nature ; as all Grocery and Chandlers Wares ; and all Metals but Silver and Gold.

Note, 1 Pound Avoirdupoiſe is equal to 14 *oz.* 11 *dwts.* 15 *gr.* ½ Troy.

APOTHECARIES WEIGHT.

			Marked.
			grs.
20 Grains	make	1 Scruple.	Э
3 Scruples,		1 Dram	3
8 Drams,		1 Ounce.	℥
12 Ounces,		1 Pound.	℔

Note, The Apothecaries mix their Medicines by this Rule, but buy and ſell their Commodities by Avoirdupoiſe Weight.

The Apothecaries Pound and Ounce, and the Pound and Ounce Troy are the ſame, only differently divided and ſubdivided.

CLOTH MEASURE.

			Marked.
			n.
4 Nails	make	1 Quarter of a Yard.	*qrs.*
3 Quarters,		1 Ell Flemiſh.	E. F.
4 Quarters,		1 Yard.	yd.
5 Quarters,		1 Ell Engliſh.	E. E.
6 Quarters,		1 French Aulne,	F. A.

The Yard is uſed in meaſuring all Sorts of woollen Cloths, Silks, moſt Linnens, Tape and Gartering.

The Ell *Engliſh,* in meaſuring Hollands.

The Ell *Flemiſh,* in meaſuring Tapeſtry.

LONG

LONG MEASURE.

			Marked.
3 Barley Corns, make	1 Inch.	{	*bar.*
			in.
12 Inches,	1 Foot.		*feet.*
3 Feet,	1 Yard.		*yd.*
6 Feet,	1 Fathom.		*fath.*
5½ Yards,	1 Rod, Pole, or Perch.		*rod. p.*
40 Poles,	1 Furlong.		*fur.*
8 Furlongs,	1 Mile.		*mile.*
3 Miles	1 League.		*lea.*
60 Miles	1 Degree.		*deg.*

N. B. A Degree is 69 Miles, 4 Furlongs, very near;
tho' commonly reckoned but 60 Miles.
This Rule is used, to measure Distance of Places, or
any Thing else, that has Length only.

LAND MEASURE.

			Marked.
9 Square Feet	make	1 Square Yard.	*f.*
30 Yards and ¼		1 Pole,	*p.*
40 Poles in Length, and 1 in Breadth,		1 Rood.	*r.*
4 Roods		1 Acre.	*Acre.*

This Measures gives the Content of any Piece of
Ground in Acres.

WINE MEASURE.

				Marked.
2 Pints	make	1 Quart.	{	*pts.*
				qts.
4 Quarts,		1 Gallon,		*gal.*
10 Gallons,		1 Anchor of Brandy.		
18 Gallons,		1 Runlet.		*run.*
31½ Gallons,		Half an Hogshead.		½ *hhd.*
42 Gallons,		1 Tierce.		*tierce.*
63 Gallons,		1 Hogshead.		*hhd.*
2 Hogsheads,		1 Pipe, or Butt.		*P.* or *Btt.*
2 Pipes, or 4 Hogsheads,		1 Tun.		*Tun.*

All

All Brandies, Spirits, Perry, Cyder, Mead, Vinegar, Honey, and Oil, are measured by this Measure; as also Milk : Not by Law, but Custom only.

The Gallon contains 231 Solid Inches.

ALE *and* BEER MEASURE

			Marked.
2 Pints	make	1 Quart.	pts. qts.
4 Quarts		1 Gallon.	gal.
8 Gallons		1 Firkin of Ale.	A. fir.
9 Gallons		1 Firkin of Beer.	B. fir.
2 Firkins		1 Kilderkin.	Kil.
4 Firkins, or 2 Kilderkins,		1 Barrel.	Bar.
1 Barrel and ½, or 54 Gallons,		1 Hogshead of Beer.	hhd.

In *London* they compute but 8 Gallons to the Firkin of Ale, and 32 to the Barrel ; but in all other Parts of *England*, for Ale, Strong Beer, and Small, 34 Gallons to the Barrel, and 8 Gallons and ½ to the Firkin.

N. B. A Barrel of Salmon, or Eels, is   42 Gallons.
      A Barrel of Herrings,   32 Gallons.
      A Keg of Sturgeon,   4 or 5 Gallons.
      A Firkin of Soap,   8 Gallons.
The Gallon of this Measure contains 282 solid Inches.

DRY MEASURE.

			Marked.
2 Pints,	make	1 Quart.	pts. qts.
2 Quarts,		1 Pottle.	pot.
2 Pottles,		1 Gallon.	gal.
2 Gallons,		1 Peck.	pk.
4 Pecks,		1 Bushel.	bu.
4 Bushels,		1 Coom.	coom.
2 Cooms, or 8 Bushel,		1 Quarter.	qr.
4 Quarter,		1 Chaldron.	chal.
5 Quarters,		1 Wey.	wey.
2 Weys,		1 Last.	last.

In *London* 36 Bushels make a Chaldron.

The

The Bushel in *Water-measure* is 5 Pecks.

A Score of Coals,   is   21 Chaldron.
A Sack of Coals   3 Bushels.
A Load of Corn,   5 Bushels.
A Cart Load ditto,   40 Bushels.

This Measure is applied to all dry Goods.

The Standard Bushel is 18 Inches and $\frac{1}{2}$ wide, and 8 Inches deep.

The Gallon is 268 solid Inches $\frac{4}{5}$.

TIME.

			Marked.
60 Seconds,	make	1 Minute.	''
60 Minutes,		1 Hour.	hour.
24 Hours,		1 Day.	day.
7 Days,		1 Week.	week.
4 Week,		1 Month.	mo.
13 Month, 1 Day, 6 Hours,		1 Julian Year.	

365 Days, 5 Hours, 48 Minutes, and 57 Seconds, 1 Solar Year.

To know the Days in each Month, observe,
Thirty Days hath September,
April, June, *and* November,
February *hath twenty-eight alone,*
All the rest have thirty and one :
Except in Leap-year, *and then's the Time,*
February's *Days are twenty and nine.*

SQUARE MEASURE.

144 Inches,	make	1 Foot.
9 Feet,		1 Yard.
100 Feet,		1 Square of Flooring.
272$\frac{1}{4}$ Feet,		1 Rod.
40 Rods,		1 Rood.
4 Roods, or 160 Rods, or 4840 Yards, 1 Acre of Land.		
640 Acres,		1 Square Mile.
30 Acres,		1 Yard of Land.
100 Acres,		1 Hide of Land.

By this Measure are measured all Things that have Length and Breadth ; such as Painting, Plaistering, Flooring, Thatching, Plumbing, and Glazing, &c.

C   SOLID

SOLID MEASURE.

1728 Inches, make 1 Solid Foot.
27 Feet, 1 Yard, or Load of Earth.
40 Feet of Round Timber, ⎫
Or, 50 Feet of Hewn Timber, ⎭ is 1 Tun, or Load.

108 Solid Feet, *i. e.* 12 Feet in Length, 3 Feet in Breadth, and 3 deep; or, commonly, 14 Feet long, 3 Feet, 1 Inch broad, and 3 Feet, 1 Inch deep, is a Stack of Wood.

128 Solid Feet, *i. e.* 8 Foot long, 4 Foot broad, and 4 Foot deep, is a Cord of Wood.

By this Measure are measured all Things that have Length, Breadth, and Depth.

ADDITION *of* MONEY, WEIGHTS, *and* MEASURES.

RULE. Add the first Row or Denomination together, as in Integers; then divide the Sum by as many of the same Denomination as make one of the next greater, setting down the Remainder under the Row added, and carry the Quotient to the next superior Denomination, continuing the same to the last, which add as in simple Addition.

PROOF. As in Integers.

	l.	*s.*	*d.*		*l.*	*s.*	*d.*		*l.*	*s.*	*d.*		*l.*	*s.*	*d.*
Money.	2	13	4½		27	7	1		35	17	3		75	3	7
	7	9	5¼		35	14	7¾		59	14	7½		54	17	1½
	5	15	4½		57	19	2¼		97	13	5¼		91	15	4¼
	9	17	6¼		91	16	1		35	16	8¼		35	16	5¾
	7	16	3		75	18	7¾		97	15	7		27	19	7½
	5	14	7¼		97	13	5		59	16	5½		91	17	3½
	9	16	5		45	16	7½		97	15	7¼		75	2	4
	6	15	4½		19	18	9¼		55	18	2½		57	13	3¾
	55	18	4¾												

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
3257	1	4¼	525	2	4¼	321	14	7¼	75	3	1½
2704	3	7¾	179	3	5	275	16	3	25	12	7
1595	5	3	350	14	7¼	379	2	4¼	95	13	5½
7059	13	7½	975	3	5¼	257	16	5½	76	17	3¾
5207	5	4	254	15	7	196	13	8¾	97	14	1
3798	16	7¾	379	14	5¾	154	2	7	54	13	7¾
1524	3	11¼	254	3	1	397	1	4½	27	19	5
2310	12	1	791	7	6	154	2	7¼	14	7	2½

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
172	4	7¼	251	17	1¼	25	1	4½	27	13	5
325	13	5	379	13	5	76	13	1	15	7	9¼
271	0	7¾	257	16	7¾	35	19	7½	9	15	3
524	19	1	184	13	5	97	17	3	15	2	7¼
379	14	3½	795	2	7¼	35	13	5¾	37	19	1
215	15	9¾	359	16	5¼	27	16	3	56	13	7¾
709	13	5¼	916	13	1	51	14	7½	78	14	1
254	17	1½	157	2	7¾	19	17	3	15	2	1¼

Troy Weight.	oz.	dwt.	gr.	oz.	dwt.	gr.	lb.	oz.	dwt.	gr.	lb.	oz.	dwt.	gr.
	7	15	21	5	11	4	7	1	2	21	5	2	15	4
	3	17	6	7	19	21	3	2	17	14	3	11	17	23
	2	5	14	3	15	14	5	1	15	21	9	7	15	4
	3	16	19	7	19	22	7	10	18	5	4	5	13	17
	9	18	23	9	18	15	2	7	14	16	3	9	7	11
	7	15	14	8	13	12	3	11	18	10	5	2	15	21
	5	18	16	7	15	18	9	7	15	2	9	3	17	15
	9	17	2	2	16	3	5	4	16	21	2	10	7	15

Avoirdupoise Weight.	lb.	oz.	dr.	lb.	oz.	dr.	cwt.	qrs.	lb.	T.	C.	qrs.	lb.
	159	15	14	17	12	3	25	1	17	7	17	2	21
	272	14	10	23	15	6	79	3	27	5	4	3	27
	303	15	11	31	11	14	54	1	6	2	5	0	16
	255	10	4	97	0	9	25	3	16	3	18	2	5
	973	6	2	48	7	15	37	0	19	7	9	3	26
	605	13	14	79	10	6	55	2	16	8	15	1	17
	517	8	9	57	15	4	71	0	27	9	10	0	6
	239	15	6	23	10	12	19	2	14	5	14	3	25

Apothe-

Apothe-	℥	3	Ə	gr.	℥	3	Ə	gr.	lb.	℥	3	Ə	lb.	℥	3	Ə	gr.
caries	7	7	1	17	9	2	1	17	7	10	7	2	7	2	1	0	17
Weight.	9	3	0	18	3	5	2	19	9	5	2	0	3	1	7	1	15
	5	6	2	16	9	2	1	14	7	11	1	2	9	10	2	0	6
	7	5	1	15	3	5	0	18	9	5	6	1	7	5	7	1	17
	3	7	0	18	7	7	2	15	7	10	5	2	3	9	5	2	0
	9	3	1	5	9	3	0	0	9	0	3	0	7	1	4	1	7
	4	7	2	16	7	2	1	5	2	7	5	2	9	3	6	0	18
	9	3	0	7	6	0	2	17	9	2	4	1	7	1	0	1	16

Cloth	E.F.	qrs.	n.	yds.	qrs.	n.	yds.	qrs.	n.	E.E.	qrs.	n.
Measure.	27	2	1	35	3	2	75	3	1	76	4	1
	15	1	3	76	2	3	97	1	3	52	1	2
	37	0	2	95	3	0	54	0	2	79	0	1
	52	1	3	76	1	3	76	2	0	56	2	0
	76	2	1	25	0	1	59	1	3	79	3	0
	97	1	3	79	2	1	76	3	1	54	2	1
	55	2	2	54	3	2	59	2	0	98	4	2
	73	0	1	76	0	2	97	0	2	75	3	1

Long	feet.	in.	bar.	yds.	f.	in.	m.	fur.	p.	lea.	m.	fur.	p.
Meas.	27	9	2	25	1	9	35	7	3	72	2	1	37
	35	10	1	71	0	3	27	5	27	27	1	7	21
	17	2	2	52	1	2	52	0	35	35	2	5	14
	35	11	1	97	0	10	97	1	17	79	0	6	2
	97	2	0	54	2	7	56	7	18	51	1	6	13
	54	8	1	37	1	4	91	5	27	72	0	5	27
	76	3	2	25	2	7	25	2	14	35	1	3	31
	52	7	1	96	0	5	17	0	15	19	0	7	16

Land	a.	r.	p.	a.	r.	p.	a.	r.	p.	a.	r.	p.
Measure.	75	3	27	27	1	35	26	1	31	32	1	14
	36	2	15	29	2	16	19	2	17	27	0	16
	97	1	16	37	1	15	55	1	14	31	2	15
	35	2	15	95	2	27	79	3	21	19	1	18
	27	1	14	62	0	13	95	2	14	36	2	37
	56	3	31	72	3	18	76	3	15	19	1	8
	78	2	28	55	1	14	14	1	10	75	0	3
	76	1	14	70	3	15	9	1	18	15	2	10

Wine Measure.

run.	gal.	qts.	tier.	gal.	qts.	hhds.	gal.	qts.	T. hhds.	gal.
27	17	2	25	36	2	31	57	1	14 3	27
35	15	3	75	41	3	97	18	2	19 2	56
56	14	1	62	15	1	76	13	1	17 0	39
97	10	3	97	13	0	55	46	2	75 2	16
52	15	0	15	14	1	87	38	3	54 1	19
79	2	1	19	17	2	54	17	1	97 3	54
98	17	2	35	3	3	97	29	2	13 1	61
14	8	0	76	12	1	17	55	1	17 0	2

Ale and Beer.

A.B.	fir.	gal.	B.B.	fir.	gal.	hhd.	gal.	qt.	hhd.	gal.	qt.
25	2	7	37	2	8	76	51	2	76	2	1
17	3	5	54	1	7	57	3	1	95	34	2
96	2	6	97	3	8	97	27	3	57	16	3
75	1	4	78	2	5	54	17	2	21	14	1
96	3	7	47	0	7	97	16	1	32	37	3
75	0	5	35	2	5	56	38	0	57	16	1
53	1	4	76	3	7	71	15	2	79	27	0
79	0	6	91	0	5	97	18	1	17	15	1

Dry Measure.

qu.	bu.	p.	qu.	bu.	p.	ch.	bu.	p.	ch.	bu.	p.
75	7	2	36	2	1	75	27	2	73	2	1
37	3	3	71	0	3	57	3	1	41	24	0
51	2	0	57	6	0	95	25	3	92	16	1
76	7	1	82	4	1	76	35	2	79	13	2
57	0	3	95	3	3	97	25	1	54	17	3
95	2	1	78	2	1	75	16	3	76	25	1
75	5	3	54	1	3	84	18	1	95	16	2
68	2	1	79	2	1	96	28	1	54	17	1

Time.

h.	m.	"	d.	h.	m.	w.	d.	h.	w.	d.	h.
52	57	35	72	23	27	71	3	11	57	2	15
97	16	27	51	14	35	51	2	9	95	3	21
16	53	45	97	13	28	76	0	21	76	0	18
96	18	31	58	21	45	95	3	21	53	2	21
75	35	21	96	20	48	76	1	15	98	0	18
64	13	13	17	14	25	84	2	18	75	1	14
75	18	47	91	18	32	75	1	16	37	0	16
93	35	18	54	17	36	95	0	18	51	1	15

The APPLICATION.

1. A Man born in the Year 1750, when will he be 47 Years of Age? *Answer* 1797.

2. A Man borrowed a Sum of Money, and Part being paid of 57 *l.* 3 *s.* the Remainder was 52 *l.* 6 *s.* what was the Sum borrowed? *Answer* 109 *l.* 9 *s.*

3. *A* owes me 5 Guineas, *B* 2 *l.* 14 *s.* 6 *d.* *C* 6 *l.* 17 *s.* 8 *d.* *D* 97 *l.* and 2 Crowns, *E* four-score and 15 *l.* how much is due to me? *Answer* 207 *l.* 7 *s.* 2 *d.*

4. *A, B, C,* and *D,* bought a Parcel of Goods; in the Purchase of which, *A* laid out 7 *l.* Half a Guinea and a Crown; *B* 49 *s.* *C* 54 *s.* 6 *d.* and *D* 87 *d.* what was laid out in all? *Answer* 13 *l.* 6 *s.* 3 *d.*

5. What's the Estate worth *per Ann.* when the Taxes are 21 Guineas, the net Income 8 score 19 *l.* 14 *s.* *Ans.* 201 *l.* 15 *s.*

6. A Man took a House for 12 Years; and, by Agreement, was to pay 100 *l.* 10 *s.* down, 114 *l.* 15 *s.* at the End of 6 Years, and 154 *l.* 15 *s.* at the End of 12 Years: How much was the whole Sum? *Answer* 370 *l.*

7. A Shopkeeper having opened a Shop, the first Week sold Goods to the Value of four-score Pounds; the Second, three-score and 5 *l.* the Third, 42 *l.* 3 *s.* and the Fourth, but 97 *s.* 6 *d.* How much did he receive in the Month? *Answer* 192 *l.* 0 *s.* 6 *d.*

8. A Gentleman left his eldest Daughter 1500 *l.* more than the Youngest, and her Fortune was 11 thousand, 11 hundred, and 11 *l.* What was the eldest Sister's Fortune, and what did the Father leave them? *Eldest Sister's Fort.* 13611 *l.* *Father left them,* 25722 *l.*

SUBTRACTION *of* MONEY, WEIGHTS, *and* MEASURES.

R U L E. Subtract as in Integers; only when any of the lower Denominations are greater than the upper, borrow as many of that as make one of the next superior, adding it to the Upper, from which take the Lesser; set down the Difference, and carry 1 to the next lower Denomination, for what you borrowed.

PROOF. As in Integers.

Money.		l.	s.	d.		l.	s.	d.
	Borrowed	715	2	7¼	Lent	316	3	5½
	Paid	476	3	8½	Reced.	218	3	1¾
	Remain to pay	238	18	10¾				
	Proof.	715	2	7¼				

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
217	2	10	3	15	1½	25	2	5¼	37	3	4½
179	3	7¼	1	14	7	17	6	8½	16	5	2½

l.	s.	d.	l.	s.	d.	l.	s.	d.	l.	s.	d.
329	17	1½	259	15	3¾	71	2	4	527	3	5¼
157	14	7	176	17	9½	19	13	7¼	139	15	7¼

	l.	s.	d.		l.	s.	d.
Borrowed	25107	15	7	Lent	25106	1	6
	375	2	5¼		271	14	7¼
Paid	259	5	7½	Received	359	15	3
at	395	13	4¾	at	475	13	9¾
different	523	17	3	several	527	15	3¾
Times	974	15	7¼	Payments	279	16	5
	325	13	5		750		
Paid in all				Received in all			
Remains to pay				Remains due			

Troy	oz.	dt.	gr.	oz.	dt.	gr.	lb.	oz.	dt.	gr.	lb.	oz.	dt.	gr.
Weight. bought	27	15	2	37	5	15	52	1	7	2	7	2	5	5
sold	21	14	7	26	7	14	39	0	15	7	5	7	10	7
unsold														

Avoirdupoise	lb.	oz.	dr.	lb.	oz.	dr.	cwt.	qrs.	lb.	T.	ct.	qrs.	lb.
Weight.	25	11	15	35	10	5	35	1	20	21	1	2	7
	17	9	15	29	12	7	25	1	21	9	1	3	5

Apothecaries

Apothecaries Weight.	℥	ʒ	Ə	gr.	℥	ʒ	Ə	gr.	lb.	℥	ʒ	Ə	lb.	℥	ʒ	Ə	gr.
	27	1	0	1	3	1	2	4	5	2	1	0	9	7	2	1	3
	15	2	0	7	1	0	0	7	2	5	2	1	5	7	3	1	7

Cloth Measure.	E.F.	qrs.	n.	yds.	qrs.	n.	yds.	qrs.	n.	E.E.	qrs.	n.
	35	2	1	47	1	0	71	1	2	35	2	1
	17	2	2	35	2	2	35	2	1	17	3	2

Long Measure.	f.	in.	bar.	yds.	f.	in.	m.	fur.	p.	lea.	m.	f.	p.
	25	1	0	37	2	1	52	1	27	271	1	7	0
	17	2	2	15	2	7	35	7	35	150	0	3	27

Land Measure.	a.	r.	p.	a.	r.	p.	a.	r.	p.	a.	r.	p.
	75	1	7	37	1	27	2	0	1	325	2	1
	39	0	27	33	2	15	17	1	0	279	3	5

Wine Measure.	run.	gal.	qts.	tier.	gal.	qts.	hhd.	gal.	qts.	tun.	hhd.	gal.
	72	1	1	25	27	1	75	57	1	79	7	14
	35	1	2	19	35	2	57	59	1	35	8	27

Ale and Beer.	A.B.	fir.	gal.	B.B.	fir.	gal.	hhd.	gal.	qts.	hhd.	gal.	qts.
	25	1	1	37	2	1	27	27	1	709	2	1
	21	1	5	25	1	7	19	50	2	157	3	2

Dry Measure.	qu.	bu.	p.	qu.	bu.	p.	ch.	bu.	p.	ch.	bu.	p.
	72	1	2	65	2	1	79	3	0	35	3	3
	35	2	3	57	2	3	54	7	1	27	5	1

Time.	h.	′	″	d.	h.	′	m.	w.	d.	m.	w.	d.
	75	1	27	72	1	51	35	2	1	25	2	1
	52	7	31	36	3	27	17	3	5	14	1	7

The APPLICATION.

1. A Man born in the Year 1723, what was his Age in the Year 1749? *Answer* 26.

2. What

2. What is the Difference between the Age of a Man born in 1710, and another born in 1749 ? *Anſwer* 39.

3. A Man borrowed 37*l.* and paid in Part 25*l.* 2*s.* 7*d.* ½, how much is left unpaid ? *Anſwer* 11*l.* 17 *s.* 4*d.* ½.

4. *A* is indebted to the Brewer the Sum of 157*l.* 2*s.* 5*d.* *B* owes him 27/3 *l.* how much does one owe more than the other ? *Anſwer* 115 *l.* 17*s.* 7*d.*

5. When an Eſtate of 300*l.* *per Ann.* is reduced, on paying of Taxes, to 12 Score, and 14*l.* 6*s.* what is the Tax ? *Anſwer* 45 *l.* 14*s.*

6. A Horſe in his Furniture is worth 37*l.* 5*s.* out of it 14 Guineas : How much does the Price of the Furniture exceed that of the Horſe ? *Anſwer* 7 *l.* 17 *s.*

7. A Merchant, at his Out-ſetting in Trade, owed 750 *l.* he had in Caſh, Commodities, the Stocks, and good Debts, 12510 *l.* 7 *s.* He cleared the firſt Year by Commerce, 452 *l.* 3*s.* 5*d.* what was his nett Balance at the 12 Months End ? *Anſwer* 12212 *l.* 10*s.* 5*d.*

8. A Gentleman dying left 45247*l.* between two Daughters; the Youngeſt was to have 15 Thouſand, 15 Hundred, and twice 15 *l.* what was the eldeſt Siſter's Fortune? *Anſwer* 28717*l.*

MULTIPLICATION *of ſeveral* ## DENOMINATIONS.

R ULE. Multiply the firſt Denomination by the Quantity given, dividing the Product by as many of that as make one of the next, ſetting down the Remainder, and add the Quotient to the next Superior, after it is multiplied.

If the given Quantity is above 12, multiply by any two Numbers which multiplied together, will make the ſame Number; but, if no two Numbers multiplied together will make the exact Number, then multiply the top Line by as many as is wanting, adding it to the laſt Product.

PROOF. By Diviſion.

l.	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*	*l.*	*s.*	*d.*
35	12	7¼	75	13	1½	62	5	4½	57	2	4¾
		2			3			4			5
71	5	2½									

lb.	oz.	dwt.	gr.		tun.	cwt.	qrs.	lb.		yds.	n.	qrs.		m.	fur.	p.
27	5	17	14		25	7	2	21		76	1	2		36	7	25
			7					8				2				5

a.	r.	p.		A.B.	fir.	gal.		B.B.	fir.	gal.		ch.	bu.	pk.
75	2	31		32	1	7		26	2	7		54	2	1
		9				7				3				5

18 *yds.* of Cloth, *at* 9 *s.* 6 *d.*
per yd.   9
$9 \times 2 = 18$
                        ────────
                            4 5 6
                                2
                        ────────
                            8 11 0
                        ────────

26 *lb.* of Tea, *at* 1 *l.* 2 *s.* 6 *d.*
per lb.   8
$8 \times 3 + 2 = 26$
                        ────────
                            9 0 0
                                3
                        ────────
                          27 0 0
Top Line $\times 2$ 2 5 0
                        ────────
                          29 5 0
                        ────────

17 *Ells* of Holland, *at* 7 *s.*
8 *d.* ½ *per Ell.*
            Facit 6 *l.* 11 *s.* 0 *d.* ½.

35 *Firkins* of Butter, *at* 15 *s.*
3 *d.* ½ *per Firkin.*
            Facit 26 *l.* 15 *s.* 2 *d.* ½.

75 *lb.* of Nutmegs, *at* 7 *s.*
2 *d.* ¾ *per lb.*
            Facit 27 *l.* 2 *s.* 2 *d.* ¾.

37 *yds.* of Tabby, *at* 9 *s.*
7 *d. per yd.*
            Facit 17 *l.* 14 *s.* 7 *d.*

97 *cwt.* of Cheese, *at* 1 *l.*
5 *s.* 3 *d. per cwt.*
            Facit 122 *l.* 9 *s.* 3 *d.*

43 *doz.* of Candles, *at* 6 *s.*
4 *d. per doz.*
            Facit 13 *l.* 12 *s.* 4 *d.*

127 *lb.* of Bohea Tea, *at*
12 *s.* 3 *d. per lb.*
            Facit 77 *l.* 15 *s.* 9 *d.*

135 *Gallons* of Rum, *at* 7 *s.*
5 *d. per Gallon.*
            Facit 50 *l.* 1 *s.* 3 *d.*

74 *Ells* of Diaper, *at* 1 *s.*
4 *d.* ½ *per Ell.*
            Facit 5 *l.* 1 *s.* 9 *d.*

6 *doz.* Pair of Gloves, *at* 1 *s.*
10 *d. per Pair.*
            Facit 6 *l.* 12 *s.*

When the given Quantity consists of ½, ¼, *&c. divide the*
Price by ½, ¼, *&c. and add it to the Product.*

25 ½ *Ells* of Holland, *at*
3 s. 4 d. ½ *per Ell.*
    5   5 × 5 = 25

————
16 10½
    5
————
4   4   4 ½ = 25
1   8 ¼ =   ½
————
46   0 ¾ = 25 ½
————

75 ½ *Ells* of Diaper, *at* 1 s.
3 d. *per Ell.*
    Facit 4 l. 14 s. 4 d. ½.
19 ½ *Ells* of Damask, *at* 4 s.
3 d. *per Ell.*
    Facit 4 l. 2 s. 10 d. ½.
35 ½ *Ells* of Dowlas, *at* 1 s.
4 d. *per Ell.*
    Facit 2 l. 7 s. 4 d.
7 ¼ *cwt.* of Malaga Raisins,
at 1 l. 1 s. 6 d. *per cwt.*
    Facit 7 l. 15 s. 10 d. ½.
6 ½ *Barrels* of Herrings, *at*
3 l. 15 s. 7 d.
    Facit 24 l. 11 s. 3 d. ½.
35 ½ *cwt.* of Double-refined
Sugar, *at* 4 l. 15 s. 6 d. *per*
cwt.
    Facit 169 l. 10 s. 3 d.
154 ½ *cwt.* of Tobacco, *at*

4 l. 17 s. 10 d. *per cwt.*
    Facit 755 l. 15 s. 3 d.
117 ¼ *Gallons* of Arrack, *at*
12 s. 6 d. *per Gallon.*
    Facit 73 l. 5 s. 7 d. ½.
85 ¾ *cwt.* of Cheese, *at* 1 l.
7 s. 8 d. *per cwt.*
    Facit 118 l. 12 s. 5 d.
29 ¼ *lb.* of Fine Hyson Tea,
at 1 l. 3 s. 6 d. *per lb.*
    Facit 34 l. 7 s. 4 d. ½.
17 ¾ *yds.* of superfine Scarlet
Drab, *at* 1 l. 3 s. 6 d. *per yd.*
    Facit 20 l. 17 s. 1 d. ½.
37 ½ *yds* of rich Brocaded
Silk, *at* 12 s. 4 d. *per yd.*
    Facit 23 l. 2 s. 6 d.
56 ¾ *cwt.* of Sugar, *at* 2 l.
18 s. 7 d. *per cwt.*
    Facit 166 l. 4 s. 7 d. ¼.
96 ½ *cwt.* of Currants, *at* 2 l.
15 s. 6 d. *per cwt.*
    Facit 267 l. 15 s. 9 d.
45 ¾ *lb.* of Belladine Silk, *at*
18 s. 6 d. *per lb.*
    Facit 42 l. 6 s. 4 d. ½.
87 *Bushels* ¾ of Wheat, *at* 4 s.
3 d. *per Bushel.*
    Facit 18 l. 12 s. 11 d. ¼.
120 ¾ *cwt.* of Hops, *at* 4 l.
7 s. 6 d. *per cwt.*
    Answer 528 l. 5 s. 7 d.

The APPLICATION.

1. There are 124 Men employed to finish a Piece of Work, and they are to have 5 Pounds each Man; how much must they have in all? *Answer* 620 l.

2. There were 25 Men concerned in the Payment of a Sum of Money, and each Man paid 5 Guineas; how much was paid in all? *Answer* 131 l. 5 s.

3. What is the Difference between 6 Dozen Dozen, and half a Dozen Dozen; and what is their Sum and Product? *Answer.* 792 *Diff.* Sum 936, *Product* 62208.

                                 4. What

4. What Difference is there between twice Eight and Fifty, and twice Fifty-eight, and what's their Product?
Answer. 50 *Difference,* 7656 *Product.*

5. There are 2 Numbers, the greater of them is 37 Times 45, and their Difference 19 Times 4; their Sum and Product are required? *Answer.* 3254 *Sum,* 2645685 *Product.*

6. The Sum of two Numbers is 360, the less of them 144; what is their Product, and the Square of their Difference? *Answer* 31104 *Product,* 5184 *Square of their Difference.*

7. If an Army, consisting of 187 Squadrons of Horse, each 157 Men, and 207 Batalions, each 560 Men, how many effective Soldiers, supposing that in 7 Hospitals there are 473 Sick? *Answer* 144806.

8. What Sum did that Gentleman receive in Dowry with his Wife, whose Fortune was her Wedding Suit; her Pettycoat having 2 Rows of Furbelows, each Furbelow 87 Quils, and each Quil 21 Guineas? *Answer* 3836 *l.* 14 *s.*

9. A Merchant had 19118 *l.* to begin Trade with. For 5 Years together he cleared 1086 *l.* a Year; the next 4 Years he made good 2715 *l.* 10 *s.* 6 *d.* a Year: But the last 3 Years he was in Trade, had the Misfortune to lose, one Year with another, 475 *l.* 4 *s.* 6 *d.* a Year: What was his real Fortune at 12 Years End? *Answer* 33984 *l.* 8 *s.* 6 *d.*

DIVISION of *several* DENOMINATIONS.

RULE. Divide the first Denomination on the Left-hand, and, if any remains, multiply them by as many of the next less as make one of that, which add to the next, and divide as before.

PROOF. By Multiplication.

l.	*s.*	*d.*		*l.*	*s.*	*d.*		*l.*	*s.*	*d.*		*l.*	*s.*	*d.*
2)25	2	4(	3)37	3	7(	4)57	1	6(	5)52	7	3(
12	11	2									

lb.	*oz.*	*dwt.*	*gr.*		*lb.*	*oz.*	*dr.*		*T.*	*cwt.*	*qrs.*	*lb.*
7)75	3	7	5(	8)35	14	13(	6)75	10	1	13(

yds.	*qrs.*	*n.*		*m.*	*f.*	*p.*		*yds.*	*f.*	*in.*
11)35	1	3(	9)76	3	27(	12)75	2	9(

A.B.	*fir.*	*gal.*		*B.B.*	*fir.*	*gal.*		*ch.*	*bu.*	*pk.*
12)35	2	5(	9)55	3	7(	11)357	2	1(

If

The APPLICATION.

1. If a Man spends 257 *l.* 2 *s.* 5 *d.* in 12 Months Time, what is that *per* Month ? *Answ.* 21 *l.* 8 *s.* 6 *d.* ¼.

2. The Clothing of 35 Charity Boys came to 57 *l.* 3 *s.* 7 *d.* what is the Expence of each ? *Answ.* 1 *l.* 12 *s.* 8 *d.*

3. If I gave 37 *l.* 6 *s.* 4 *d* ¾ for 9 Pieces of Cloth, what did I give *per* Piece ? *Answ.* 4 *l.* 2 *s.* 11 *d.*

4. If 20 Cwt. of Tobacco came to 27 *l.* 5 *s.* 4 *d.* ½, at what Rate is that *per* Cwt. *Answ.* 1 *l.* 7 *s.* 3 *d.*

5. What is the Value of one Hogshead of Beer, when 120 are sold for 154 *l.* 17 *s.* 10 *d.* *Answ.* 1 *l.* 5 *s.* 9 *d.* ¾.

6. Bought 72 Yards of Cloth for 85 *l.* 6 *s.* I desire to know at what Rate *per* Yard ? *Answ.* 1 *l.* 3 *s.* 8 *d.* ¼.

7. Gave 275 *l.* 3 *s.* 4 *d.* for 36 Bales of Cloth, what is that for 2 Bales ? *Answ.* 1 *l.* 5 *s.* 8 *d* ¾.

8. A Prize of 7257 *l.* 3 *s.* 6 *d.* is to be equally divided amongst 500 Sailors, what is each Man's Share ? *Answ.* 14 *l.* 10 *s.* 3 *d.* ¼.

9. There were a certain Number of Men concern'd in the Payment of 15275 *l.* and each paid 5 *l.* what was the Number of Men ? *Answ.* 3055 *l.*

10. A Gentleman has a Garden wall'd in, containing 9625 Yards, the Breadth was 35 Yards, what was the Length ? *Answ.* 275.

11. A certain Man intending to go a Journey of 3270 Miles, would compleat the same in 136 Days, I demand how many Miles he must travel each Day ? *Answ.* 24.

12. A Trader clear'd 1156 *l.* equally in 17 Years, how much did he lay by in a Year ? *Answ.* 68 *l.*

13. Another clear'd 2805 in 7 ½ Years, what was his yearly Increase of Fortune ? *Answ.* 374 *l.*

14. What Number to the 43d Part of 4429 will raise it to 240 ? *Answ.* 137.

15. Divide 20 *s.* between *A. B.* and *C.* in such Sort, that *A.* may have 2 *s.* less than *B* and *C.* 2 *s.* more than *B.* ? *Answ.* *A.* 4 *s.* 8 *d.* *B.* 6 *s.* 8 *d.* *C.* 8 *s.* 8 *d.*

16. If there are 1000 Men to a Regiment, and but 50 Officers, how many private Men are there to one Officer ? *Answ.* 19.

17. What Number is that which multiplied by 7847, will make the Product 3013248 ? *Answ.* 384.

18. The Quotient is 1083, the Divisor 28604, what was the Dividend, if the Remainder came out 1788 ? *Answer,* 30979920.

D   PILLS

BILLS OF PARCELS.

HOSIER's.

Mr. John Thomas

  Bought of Samuel Green, *March* 7, 1750.

			s.	d.		
8	Pair of Worsted Stockings	at	4	6	per Pair	L.
5	Pair of Thread ditto	— at	3	2	—	—
3	Pair black Silk ditto	— at	14	0	—	—
6	Pair of milled Hose	— at	4	2	—	—
4	Pair Cotton ditto	— at	7	6	—	—
2	Yards of fine Flannel	— at	1	8	per Yard	

        L. 7   12   2

MERCER's.

Mr. Isaac Grant

  Bought of John Sims, *March* 12, 1750.

			s.	d.		
15	Yards of Satten	— — at	9	6	per Yard L.	
18	Yards of flower'd Silk	at	17	4	—	—
12	Yards of rich Brocade	at	19	8	—	—
16	Yards of Sarsenet	— at	3	2	—	—
13	Yards of Genoa Velvet	at	27	6	—	—
23	Yards of Lustring	— at	6	3	—	—

        L. 62   2   5

LINEN DRAPER's.

Mr. Simon Surety

  Bought of Josiah Short, 27 *March*, 1750.

			s.	d.		
4	Yards of Cambric	— at	12	6	per Yard L.	
12	Yards of Muslin	— at	8	3	—	—
15	Yards of printed Linen	at	5	4	—	—
2	Dozen of Napkins	— at	2	3	each	—
14	Ells of Diaper	— at	1	7	per Ell	
35	Ells of Dowlas	at	1	1½	—	

        L. 17   4   6½

MILLENER'S.

Mrs. Bright

Bought of Lucy Brown, 5 *April*, 1750.

		l.	*s.*	*d.*		
18	Yards of *fine Lace* at		12	3	per Yard L.
5	Pair of *fine kid Gloves* at		2	2	per Pair
12	Fans of *French Mount* at		3	6	each
2	Fine *lac'd Tippets* at	3	3	0	— —
4	Dozen of *Irish Lamb* at		1	3	per Pair
6	Sets of *Knots* — at		2	6	per Set

L. 23 14 4

WOOLLEN-DRAPER'S.

Mr. Thomas Sage

Bought of Ellis Smith, 7 *April*, 1750.

		s.	*d.*		
17	Yards of *fine Serge* at	3	9	per Yard L.
18	Yards of *Drugget* at	9	0	— —
15	Yards of *superfine Scarlet* at	22	0	—
16	Yards of *black ditto* at	18	0	— —
25	Yards of *Shalloon* at	1	9	— —
17	Yards of *Drab* — at	17	6	— —

L. 59 5 0

LEATHER-SELLER'S.

Mr. Giles Harris

Bought of Abel Smith, 15 *April*, 1750.

		s.	*d.*		
27	Calf *Skins* — at	3	9	per Skin L.
75	Sheep *Skins* — at	1	7	—
36	Coloured *ditto* — — at	1	8	—
15	Buck *Skins* — — at	11	6	—
17	*Russia Hides* — — at	10	7	each
120	Lamb *Skins* — — at	1	$2\frac{1}{2}$	—

L. 38 17 5

GRO-

GROCER's.

Mr. Richard Groves
-        *Bought of* Francis Ellot, 21 *April*, 1750.

		s.	d.	
25 lb. *of Lump Sugar* —	at	0	6½	*per* lb. *L.*
2 *Loaves of double refined* Weight 15 lb. — }	at	0	11½	— —
14 lb. *of Rice* —	at	0	3	— —
28 lb. *of Malaga Raisins*	at	0	5	— —
15 lb. *of Currants* —	at	0	5½	— —
7 lb. *of Black Pepper* —	at	1	10	—

           L. 3   2   9½

CHEESEMONGER's.

Mr. Charles Cross
-        *Bought of* Samuel Grant, 23 *April*, 1750.

		s.	d.	
8 lb. *of* Cambridge *Butter* — —	at	0	6 *per* lb. *L.*	
17 lb. *of new Cheese* — —	at	0	4	
½ *Firkin of Butter,* Weight 28 lb.	at	0	5½	—
5 Cheshire *Cheeses,* Weight 127 lb.	at	0	4	—
2 Warwickshire *ditto,* Weight 15 lb.	at	0	3	—
12 lb. *of Cream Cheese* —	at	0	6	—

           L. 3   14   7

CORN-CHANDLER's.

Mr. Abraham Doyley
-        *Bought of* Isaac Jones, 25 *April*, 1750.

			s.	d.	
Tares	19 *Bushels* —	at	1	10	*per Bushel. L.*
Peas	18 *Bushels* —	at	3	9½	— —
Malt	7 *Quarters* —	at	25	0	*per Quarter*
Hops	15 lb. —	at	1	5	*per* lb.
Oats	6 *Quarters* —	at	2	4	*per Bushel*
Beans	12 *Bushel* —	at	4	8	— —

           L. 23   7   4

R E-

REDUCTION

IS the bringing or reducing Numbers of one Denomination into other Numbers of another Denomination, retaining the fame Value, and is performed by Multiplication and Divifion.

Firft, All great Names are brought into fmall, by multiplying with fo many of the lefs as make one of the greater.

Secondly, All fmall Names are brought into great, by dividing with fo many of the lefs as make one of the greater.

TABLE of Coins *as are current in* England.

	l.	*s.*	*d.*		*l.*	*s.*	*d.*
Double *Johns* of	3	12	0	*Guinea*	1	1	0
Johns —— ——	1	16	0	*Half ditto* -	0	10	6
Half ditto - -	0	18	0	$\frac{1}{4}$ *ditto* -	0	5	3
$\frac{1}{4}$ *ditto* - -	0	9	0	*Crown* -	0	5	0
$\frac{1}{8}$ *ditto* - -	0	4	6	*Half ditto* -	0	2	6
Moidore - -	1	7	0				
Half ditto - -	0	13	6	Note, *There are fe-*			
Quarter ditto -	0	6	9	*veral Pieces that fpeak*			

Thefe are Portugal Pieces.

their own *Value, fuch as a Sixpence, Fourpence, Threepence, Twopence, Penny, Halfpenny, Farthing.*

REDUCTION *Defcending.*

1. In 8*l.* how many Shillings and Pence ?
20

—————

160 *Sh.*
12

—————

1920 *Pence*

2. In 12 *l.* how many Shillings, Pence and Farthings ?
Anfw. 240 *s.* 2880 *d.* 11520 *far.*

3. How many Shillings, Pence and Farthings are there in 18*l. Anfw.* 360 *s.* 4320 *d.* 17280 *far.*

4. Reduce 7*l.* and a Crown into Shillings and Pence ?
Anfw. 145 *s.* 1740 *d.*

5. How many Farthings are there in 21 Guineas ?
Anfw. 21168.

D 3　　　　　　　　　　　　6. In

6. In 17 *l.* 5 *s.* 3 *d* $\frac{1}{4}$ how many Farthings ? *Answ.* 16573.

7. In 25 *l.* 14 *s.* 1 *d.* how many Shillings and Pence ? *Answ.* 514 *s.* 6169 *d.*

8. In 15 Crowns, how many Shillings and Sixpences ? *Answ.* 75 *s.* 150 *Sixpences.*

9. How many Crowns and Shillings in 25 *l.* *Answ.* 100 *cr.* 500 *s.*

10. In 57 Half Crowns, how many Pence and Farthings ? *Answ.* 1710 *d.* 6840 *far.*

11 Reduce 250 Crowns into Shillings, Groats and Pence ? *Answ.* 1250 *s.* 3750 *gr.* 15000 *d.*

12. How many Half Crowns, Sixpences and Threepences in 75 *l. Answ.* 600 *half cr.* 3000 *sixp.* 6000 *threepences.*

R E D U C T I O N *Ascending.*

1. In 1920 Pence, how many Shillings and Pounds ? *Answ.* 160 *s.* 8 *l.*   12)1920

                                        2|0)16|0(*Sh.*

                                           8 *l.*

2. In 11520 Farthings, how many Pence, Shillings and Pounds ? *Answ.* 2880 *d.* 240 *s.* 12 *l.*

3. How many Pence, Shillings and Pounds are there in 17280 Farthings ? *Answ.* 4320 *d.* 360 *s.* 18 *l.*

4. Reduce 1740 Pence into Shillings and Pounds ? *Answ.* 145 *s.* 7 *l.* 5 *s.*

5. How many Guineas in 21168 Farthings ? *Answ.* 21 *guin.*

6. In 16573 Farthings, how many Pounds ? *Answ.* 17 *l.* 5 *s.* 3 *d.* $\frac{1}{4}$.

7. In 6169 Pence, how many Shillings and Pounds ? *Answ.* 514 *s.* 25 *l.* 14 *s.* 1 *d.*

8. In 900 Pence, how many Shillings and Crowns ? *Answ.* 75 *s.* 15 *cr.*

9. How many Crowns and Pounds in 500 Shillings ? *Answ.* 100 *cr.* 25 *l.*

10. In 6840 Farthings, how many Pence and Half Crowns ? *Answ.* 1710 *d.* 57 *half cr.*

11. Reduce 15000 Pence into Groats, Shillings and Crowns. *Answ.* 3750 *gr.* 1250 *s.* 250 *cr.*

12. How many Sixpences, half Crowns and Pounds in 6000 Threepences ? *Answ.* 3000 *sixp.* 600 *half cr.* 75 *l.*

Ascend-

Ascending and Descending.

1. In 1560 Pence how many Crowns and Shillings ?
Answ. 26 *cr.* 130 *s.*   6|0)156|0(

26 *cr.*
5
—————
130 *s.*

2. Reduce 130 Shillings into Crowns and Pence ?
Answ. 26 *cr.* 1560 *d.*

3. How many Shillings, Crowns and Pounds in 60 Guineas ? 1260 *s.* 252 *cr.* 63 *l.*

4. In 63 *l.* how many Crowns, Shillings and Guineas ?
Answ. 252 *cr.* 1260 *s.* 60 *Guin.*

5 Reduce 76 Moidores into Shillings and Pounds ?
Answ. 2052 *s.* 102 *l.* 12 *s.*

6. Reduce 102 *l.* 12 *s.* into Shillings and Moidores.
Answ. 2052 *s.* 76 *moid.*

7. How many Shillings, half Crowns and Crowns are there in 556 *l.* and of each an equal Number ?
Answ. 1308 *of each, and* 2 *s. over.*

8. In 1308 half Crowns, as many Crowns and Shillings, how many Pounds ? *Answ.* 555 *l.* 18 *s.*

9. Seven Men brought 15 *l.* 10 *s* each into the Mint to be chang'd into Guineas, how many muft they have in all ? *Answ.* 103 *Guineas,* 7 *s. over.*

10. If 103 Guineas and 7 Shillings is to be divided among 7 Men, how many Pounds Sterling is that to each ?
Answ. 15 *l.* 10 *s.*

11. A certain Perfon had 25 Purfes, and in each Purfe 12 Guineas, a Crown and a Moidore, how many Pounds Sterling had he in all ? *Answ.* 355 *l.*

12. A certain Tenant was behind with his Landlord for 18 Years Rent, at 25 *l.* 10 *s. per Ann.* how much was the Debt ? *Answ* 459.

TROY WEIGHT.

1. In 27 Ounces of Gold, how many Grains ?
Answ. 12960.

2. In

2. In 12960 Grains of Gold, how many Ounces? *Answ.* 27.

3. In 3 *lb.* 10 *oz.* 7 *dwt.* 5 *gr.* how many Grains? *Ans.* 22253.

4. In 25 *lb.* of Silver, how many Spoons each 1 *oz.* 15 *dwt.* *Answ.* 171, and 15 *dwt.* over.

5. How many Pounds Troy are there in 171 Spoons, each weighing 1 *oz.* 15 *dwt. Answ.* 24 *lb.* 11 *oz.* 5 *dwt.*

6. Bought 7 Ingots of Silver, each containing 23 *lb.* 5 *oz.* 7 *dwt.* how many Grains? *Answ.* 945336.

7. A Gentleman sent a Tankard to his Goldsmith, that weighed 50 *oz.* 8 *dwt.* and ordered him to make it into Spoons, each to weigh 2 *oz.* 16 *dwt.* how many had he? *Answ.* 18.

8. A Goldsmith having 5 Ingots of Silver, each weighing 29 *oz.* 10 *dwt.* was minded to make them into Spoons of 1 *oz.* 15 *dwt.* Cups of 4 *oz.* 10 *dwt.* Snuff-boxes of 3 *oz.* and Salts of 1 *oz.* 5 *dwt.* and to have an equal Number of each, what was that Number? *Answ.* 14 *of each Sort, and* 10 *dwt. over.*

AVOIRDUPOIS WEIGHT.

Note. There are several Sorts of Silk which are weighed by a great Pound of 24 *oz.* others by the common Pound of 16 *oz.* therefore

To bring great Pounds into common, multiply by 3, and divide by 2, or add one half.

To bring small Pounds into great, multiply by 2, and divide by 3, or subtract one third.

Things bought and sold by the Tale.

Dozens.		*Paper and Parchment.*	
12 *Pieces or Things make*	1 *Dozen.*	24 *Sheets make*	1 *Quire.*
12 *Dozen*	1 *Gross.*	20 *Quire*	1 *Ream.*
12 *Gross, or* 144 *Dozen*	1 *great* ⎫	2 *Reams*	1 *Bundle.*
Gross.	⎬	1 *Doz. of Par.*	12 *Skins.*
		12 *Skins*	1 *Roll.*

1. In 14769 Ounces, how many *cwt.*
Answ. 8 *cwt.* 0 *qrs.* 27 *lb.* 1 *oz.*

2. Reduce 8 *cwt.* 0 *qrs.* 27 *lb.* 1 *oz.* into Quarters, Pounds, and Ounces. *Answ.* 32 *qrs.* 923 *lb.* 14769 *oz.*

3. Bought

3. Bought 32 Bags of Hops, each 2 *cwt.* 1 *qr.* 14 *lb.* and another of 150 *lb.* how many *cwt.* in the whole?
Answ. 77 *cwt.* 1 *qr.* 10 *lb.*

4. In 5 Tons of Iron, how many *cwt.* *qrs.* and *lb.*
Answ. 100 *cwt.* 400 *qrs.* 11200 *lb.*

5. In 750 great Pounds of *Morea* Silk, how many Ounces and Drams? *Answ.* 18000 *oz.* 288000 *dr.*

6. In 27 *cwt.* of Raisins, how many Parcels of 18 *lb.* each *Answ.* 168.

7. In 512 Parcels of Sugar each 25 *lb.* how many *cwt?* *Answ.* 114 *cwt.* 1 *qr.* 4 *lb.*

8. In 547 great Pounds how many common Pounds? *Answ.* 820 *com. pds.* 8 *oz.*

9. In 25 Pigs of Lead, each weighing 4 *cwt.* ¼ how many Fother? *Answ.* 5 *foth.* 8 *cwt.* 3 *qrs.*

10. How many Pounds in 27 Hogsheads of Tobacco, each weighing neat 8 *cwt.* ¾? *Answ.* 26460.

11. In 552 common Pounds of Silk, how many great Pounds? *Answ.* 368.

12. How many Parcels of Sugar of 16 *lb.* 2 *oz.* are there in 16 *cwt.* 1 *qr.* 15 *lb.* *Answ.* 113 *par.* 12 *lb.* 14 *oz.*

The Allowances usually made in this Weight are, TARE, TRETT, *and* CLOFF.

TARE is an Allowance made to the Buyer for the Weight of the *Box, Barrel, Bag,* &c. which contains the Goods bought, and is either

At so much *per Box, Bag, Barrel,* &c.

At so much *per Cent.* or

At so much in the *Gross Weight.*

TRETT is an Allowance of 4 *lb.* in every 104 *lb.* for Waste, Dust, *&c.* made by the Merchant to the Buyer.

CLOFF is an Allowance of 2 *lb.* to the Citizens of *London* on every Draught above 3 *cwt.* on some Sort of Goods.

GROSS WEIGHT is the whole Weight of any Sort of Goods, and that which contains it.

SUTTLE is when Part of the Allowance is deducted from the Gross.

NEAT is the pure Weight when all Allowances are deducted.

RULE 1st. When the Tare is at so much *per* Bag, Barrel, *&c.* multiply the Number of Bags, Barrels, *&c.* by the Tare, and subtract the Product from the Gross the Remainder is neat.

Note,

Note. *To reduce Pounds into Gallons, multiply by 2, divide by 15.*

1. In 7 Frails of Raisins, each weighing 5 *cwt.* 2 *qrs.* 5 *lb.* grofs, Tare, at 23 *lb. per* Frail, how much neat Weight? *Anfw.* 37 *cwt.* 1 *qr.* 14 *lb.*

```
    23                    5  2  5
     7 4)                       7
 28 )161( 5          38  3  7 = grofs wt.
    140   1 . 1       1  1  21 = Tare
     21              37  1  14   neat.
```

2. In 241 Barrels of Figs, each 3 *qrs.* 19 *lb.* Grofs, Tare 10 *lb. per* Barrel, how many *lb.* neat ? *Anfwer* 22413.

3. What is the neat Weight of 25 Hogfheads of Tobacco, weighing grofs 163 *cwt.* 2 *qrs.* 15 *lb.* Tare 100 *lb. per* Hogfhead ? *Anfwer,* 141 *cwt.* 1 *qr.* 7 *lb.*

4. Bought 50 Bales of *Smyrna* Silk, each 296 *lb.* Grofs, Tare *per* Bale 15 *lb.* what is the neat Weight ?
Anfwer, 125 *cwt.* 1 *qr.* 22 *lb.*

RULE 2. When the Tare is at fo much in the whole Grofs Weight, fubtract the given Tare from the Grofs, the Remainder is neat ?

1. What is the neat Weight of 5 Hogfheads of Tobacco, weighing Grofs 75 *cwt.* 1 *qr.* 14 *lb.* Tare in the whole 752 *lb* ? *Anfwer,* 68 *cwt.* 2 *qrs.* 18 *lb.*

2. In 3 Hogfheads of Tobacco, containing as under, how much neat Weight ?

```
         cwt.
N . 1    5 1  2  Tare 105 lb.
    2    3 2 17       83
    3    4 1 15       92   Anfw. 10 cwt. 3 qrs. 6 lt.
```

RULE 3. When the Tare is fo much *per cent.* divide the Grofs Weight by the aliquot Parts of an *cwt.* which fubtract from the grofs, the Remainder is neat.

Note, 7 *lb.* is $\frac{1}{16}$ 14 *lb.* is $\frac{1}{8}$
      8      $\frac{1}{14}$ 16 *lb.* is $\frac{1}{7}$

1. What

1. What is the neat Weight of 18 Butts of Currants, each 8 *cwt.* 2 *qrs.* 5 *lb.* Tare at 14 *lb. per Cent.* ?

$$
\begin{array}{ccc}
8 & 2 & 5 \\
 & & 9 \times 2 = 18. \\
\hline
76 & 3 & 17 \\
 & & 2 \\
\hline
\end{array}
$$

$$
14 = \tfrac{1}{8}) \begin{array}{ccc}
153 & 3 & 6 \\
19 & 0 & 25\tfrac{1}{4} \\
\hline
134 & 2 & 8\tfrac{3}{4} \\
\end{array}
$$

2. In 25 Barrels of Figs each 2 *cwt.* 1 *qr.* Grofs, Tare *per Cent.* 16 *lb.* how much neat Weight ?

Anfwer, 48 *cwt.* 0 *qrs.* 24 *lb.*

3. What is the neat Produce of 25 Barrels of Anchovies, each Grofs 35 *lb.* Tare *per Cent.* 10 *lb.* ?

Anfwer 7 *cwt.* 0 *qrs.* 13 *lb.*

4. In 17 Barrels of Pot-Afh, each Grofs 173 *lb.* Tare 10 *per Cent.* how much neat Weight ?

Anfwer, 23 *cwt.* 3 *qrs.* 18 *lb.* $\tfrac{1}{2}$.

5. What is the neat Weight of 12 Cafks of Argol, Grofs 84 *cwt.* 2 *qrs.* 14 *lb.* Tare *per Cent.* 14 *lb.* ?

Anfwer, 74 *cwt* 0 *qrs.* 5 *lb.* $\tfrac{1}{4}$.

RULE 4. When Trett is allowed with Tare, divide the Pounds Suttle by 26, the Quotient is the Trett, which fubtract from the Suttle, the Remainder is neat.

1. In 37 Butts of Currants each, 12 *cwt.* 2 *qrs.* 24 *lb.* Grofs, Tare, 14 *lb. per Cent.* Trett. 4 *lb. per* 104 *lb.* how many Pounds neat ?

$$
\begin{array}{ccc}
12 & 2 & 24 \\
 & 4 & \\
\hline
 & 50 & \\
 & 28 & \\
\hline
\end{array}
$$

$$
14 = \tfrac{1}{8} \begin{array}{l}
1424 \ \textit{Grofs,} \\
178 \ \textit{Tare,} \\
\end{array}
$$

$$
26) \begin{array}{l}
1246 \ \textit{Suttle,} \\
47 \ \textit{Trett,} \\
\hline
1199 \ \textit{neat.}
\end{array}
$$

2. In

2. In 7 *cwt.* 3 *qrs.* 27 *lb.* Grofs, Tare 36 *lb.* Trett 4 *lb.* per 104 *lb.* how many *lb,* neat? *Anfwer* : 26 *lb.*

3. In 152 *cwt.* 1 *qr.* 3 *lb.* Grofs, Tare 10 *lb. per Cent.* Trett 4 *lb. per* 104 *lb.* how much neat Weight?

Anfwer, 133 *cwt.* 1 *qr.* 11 *lb.* ½.

4. In 15 Chefts of Sugar, weighing 117 *cwt.* 0 *qrs.* 21 *lb.* Grofs, Tare 173 *lb.* Trett 4 *lb. per* 104 *lb.* how many *cwt.* neat? *Anfwer,* 111 *cwt.* 0 *qrs.* 22 *lb.*

RULE 5. When Cloff is allowed, divide the *cwts.* (after Trett is taken) by 3, the Quotient is fo many double *lbs.* which multiply by 2 to bring them into Pounds, or divide by 56 to bring them into *cwts.* fubtract it from the Suttle, the Remainder is neat.

1. What is the neat Weight of 3 Hogfheads of Tobacco, weighing 15 *cwt.* 3 *qrs.* 20 *lb.* Grofs, Tare 7 *lb. per Cent.* Trett 4 *lb. per* 104 Cloff. 2 *lb.* for 3 *cwt.*?

Anfwer, 14 *cwt.* 1 *qr.* 3 *lb.*

7 = 1/16	15	3	20	*Grofs,*
		3	27½	*Tare,*
1/16	14	3	20½	*Suttle,*
		2	8	*Trett,*
	14	1	12½	*Suttle,*
			9½	*Cloff,*
	14	1	3	*neat.*

2. In 7 Hogfheads of Tobacco, each weighing Grofs 5 *cwt.* 2 *qrs.* 7 *lb.* Tare 8 *lb. per Cent.* Trett 4 *lb. per* 104 *lb.* Cloff 2 *lb. per* 3 *cwt.* how much neat Weight? *Anfwer* 34 *cwt.* 2 *qrs.* 7 *lb.* ¾.

APOTHECARIES WEIGHT.

1. In 27 *lbs.* 7 ℥ 2 ʒ 1 Ɵ 2 *grs.* how many Grains? *Anfwer,* 159022.

2. How many *lbs.* ℥ ʒ Ɵ and *grs.* are there in 159022. *Anfwer,* 27 *lbs.* 7 ℥ 2 ʒ 1 Ɵ 2 *grs.*

CLOTH MEASURE.

1. In 27 Yards, how many Nails? *Anfwer,* 432.
2. In 75 Ells *Englifh,* how many Yards? *Anfwer,* 93 *yds.* 3 *qrs.*
3. In 93 ¾ Yards, how many *Englifh* Ells? *Anfwer,* 75.

4. In 24 Pieces, each containing 32 Flemish Ells, how many Ells English? *Answer,* 460 *Ells,* 4 *qrs.*

5. In 17 Pieces of Cloth, each 27 Ells Flemish, how many Yards? *Answer,* 344 *Yards,* 1 *qr.*

6. Bought 27 Pieces of English Stuffs, each 27 Ells how many Yards? *Answ.* 911 *yds.* 1 *qr.*

7. In 911 Yards, 1 Quarter, how many English Ells? *Answ.* 729.

8. In 12 Bales of Cloth, each 25 Pieces, each 15 Ells Eng. how many Yards? *Answ.* 5625.

LONG MEASURE.

1. In 57 Miles, how many Furlongs and Poles? *Answ.* 456 *Furlongs,* 18240 *Poles.*

2. In 7 Miles, how many Feet, Inches and Barley Corns? *Answ.* 36960 *Feet,* 443520 *Inches,* 1330560 *Barley Corns.*

3. In 18240 Poles, how many Furlongs and Miles? *Answ.* 456 *Furlongs,* 57 *Miles.*

4. In 72 Leagues, how many Yards? *Answ.* 380160.

5. In 380160 Yards, how many Miles and Leagues? *Answ.* 216 *Miles,* 72 *Leagues.*

6. If from *London* to *York* be accounted 50 Leagues, I demand how many Miles, Yards, Feet, Inches and Barley Corns? *Answ.* 150 *m.* 264000 *yds.* 792000 *f.* 9504000 *in.* 28512000 *b. c.*

7. How many Barley Corns will reach round the World, which is 360 Degrees, each Degree 69 Miles and an half? *Answ.* 475801600 *b. c.*

LAND MEASURE.

1. In 27 Acres, how many Roods and Perches? *Answ.* 108 *Roods,* 4320 *Perches.*

2. In 4320 Perches, how many Acres? *Answ.* 27.

3. A Person having a Piece of Ground, containing 37 Acres, 1 Pole, has a Mind to dispose of 15 Acres to *A*, I desire to know how many Perches he will have left? *Answ.* 3521.

4. There are 4 Fields to be divided into Shares of 75 Perches each, the first Field containing 5 Acres, the second 4 Acres, 2 Poles, the third 7 Acres, 3 Roods, and the fourth 2 Acres, 1 Rood, I desire to know how many Shares are contain'd therein? *Answ.* 40 *Shares,* 42 *Perches.*

E   WINE

WINE MEASURE.

1. Bought 5 Tun of Port Wine how many Gallons and Pints ? *Answ.* 1260 *Gall.* 10080 *Pints.*

2. In 10080 Pints, how many Tuns ? *Answ.* 5.

3. A Vintner is desirous to draw off a Pipe of Canary into Bottles, containing Pints, Quarts, and 2 Quarts, and of each an equal Number, how many of each Sort must he have ? *Answ.* 144.

4. A Gentleman ordered his Butler to bottle off $\frac{2}{3}$ of a Pipe of *French* Wine into Quarts, and the rest into Pints, I desire to know how many Dozen of each he had ?

Answ. 28 *doz. of each.*

ALE AND BEER.

1. In 46 Barrels of Beer, how many Pints ? *Ans.* 13248

2. In 10 Barrels of Ale, how many Gallons and Quarts ? *Answ.* 320 *galls,* 1280 *qts.*

3. In 72 Hogsheads of Beer, how many Barrels *Answ.* 108 *Barrels.*

4. If a Back contains 35 Barrels of Beer, how many Hogsheads ? *Answ.* 23 *hhd.* 18 *gall.*

DRY MEASURE.

1. In 120 Quarters of Wheat, how many Bushels, Pecks, Gallons and Quarts? *Answ.* 960 *B.* 3840 *P.* 7680 *g.* 30720 *q.*

2. In 30720 Quarts of Corn, how many Quarters ? *Answ.* 120.

3. In 20 Chaldron of Coals, how many Pecks ? *Answ.* 2880.

4. In 273 Lasts of Corn how many Pecks ? *Answ.* 87360.

TIME.

1. In 72015 Hours, how many Weeks. *Answ.* 428 *w.* 4 *d.* 15 *h.*

2. How many Days is it since the Birth of our Saviour to Christmas 1749. *Answ.* 638822 *days,* 6 *hours.*

3. *Stowe* writes, *London* was built 1108 Years before our Saviour's Birth, how many Hours is it since, to *Christmass* 1749. *Answ.* 25044462 *Hours.*

4. From the 17th of *November,* 1738, to the 12th of *September,* 1739, how many Days ? *Answ.* 299.

5. From the 18th of *July* 1749, to the 27th *Deccember* the same Year, how many Days ? *Answ.* 162 *days.*

6. From

6. From the 18th of *July* 1723, to the 18th of *April,* 1750, how many *Years* and *Days*? *Answ.* 26 *years,* 9770 *days, reckoning* 365 *days,* 6 *hours, a year.*

The SINGLE RULE *of* THREE DIRECT

TEACHETH by three Numbers given to find out a fourth, in such Proportion to the third, as the second is to the first.

RULE. First state your Question, *i. e.* place your Numbers in such Order, that the first and third be of one kind, and the second the same as the Number required, then bring your first and third Numbers into one Name, and the second into its lowest Term mention'd. Multiply your second and third Numbers together, and divide the Product by the first, the Quotient will be the Answer to the Question in the same Denomination you left your second Number in.

• EXAMPLES.

1. If 1 *lb.* of Sugar cost 4 *d.*½ what cost 54 *lb.*

$$1 : 4\tfrac{1}{2} :: 54 : 1l.\ 0s.\ 3d.$$

$$4 \qquad 18$$

$$18 \qquad 4)972$$

$$12)\ 243$$

$$20s.\ 3d.$$

2. If 1 *lb.* of Sugar cost 4 *d.* what cost 1 *cwt. Answer,* 1 *l.* 17 *s.* 4 *d.*

3. If 1 *cwt.* of Sugar cost 1 *l.* 17 *s.* 4 *d.* what is that *per lb. Answer,* 4 *d.*

4. If a Gallon of Ale cost 3 *d.* what is that *per* Barrel? *Answer,* 9 *s.*

5. If 1 Pair of Shoes cost 4 *s.* 6 *d.* what will 12 Dozen come to? *Answ.* 32 *l.* 8 *s.*

6. If 12 Dozen Pair of Stockings cost 32 *l.* 8 *s.* what is that *per Pair? Answer,* 4 *s.* 6 *d.*

7. Sold 3 *cwt.* of Tobacco at 18 *d. per lb.* what is the Worth of the whole? *Answer,* 25 *l.* 4 *s.*

8. Bought 19 Chaldron of Coals, at 29 *s.* 6 *d. per* Chaldron, what do they come to? *Answer,* 28 *l.* 0 *s.* 6 *d.*

9. If 1 Yard of Cloth cost 15 *s.* 6 *d.* what will 32 Yards cost at the same Rate? *Answer,* 24 *l.* 16 *s.*

10. If

10. If 32 Yards of Cloth cost 24 *l.* 16 *s.* what is the Value of one Yard? *Answer,* 15 *s.* 6 *d.*

11. If 1 *lb.* of Sugar cost 10 *d.* $\frac{1}{2}$, what is the Worth of 1 *cwt?* *Answer,* 4 *l.* 18 *s.*

12. If I gave 4 *l.* 18 *s.* for 1 *cwt.* of Sugar, at what Rate did I buy it at *per lb. Answer,* 10 *d.* $\frac{1}{2}$.

13. If I buy 20 Pieces of Cloth, each 20 Ells, for 12 *s.* 6 *d.* *per Ell,* what is the Value of the whole? *Answer,* 250 *l.*

14. Bought 20 Pieces of Holland, each 20 Ells, for 250 *l.* what is that *per* Ell? *Answer,* 12 *s.* 6 *d.*

15. What will 25 *cwt.* 3 *qrs.* 14 *lb.* of Tobacco come to at 15 *d.* $\frac{1}{2}$. *Answer.* 187 *l.* 3 *s.* 3 *d.*

16. Gave 187 *l.* 3 *s.* 3 *d.* for 25 *cwt.* 3 *qrs.* 14 *lb.* of Tobacco, at what Rate did I buy it at *per lb.?* *Answ.* 15 *d.*$\frac{1}{2}$.

17. Bought 27 Yards, 1 Quarter of Muslin at 6 *s.* 9 *d.* $\frac{1}{2}$ *per* Yard, what does it amount to? *Answer,* 9 *l.* 5 *s.* 0 *d.* $\frac{3}{4}$.

18. Bought 17 *cwt.* 1 *qr.* 14 *lb.* of Iron, at 3 *d.* $\frac{3}{4}$ *per lb.* what does it come to? *Answer,* 26 *l.* 7 *s.* 0 *d.* $\frac{1}{2}$.

19. If Coffee is sold for 5 *d.* $\frac{1}{2}$ *per* Ounce, what must be given for 2 *cwt. Answer,* 82 *l.* 2 *s.* 8 *d.*

20. How many Yards of Cloth may be bought for 21 *l.* 11 *s.* 1 *d.*$\frac{1}{2}$, when 3 Yards and 1 half cost 2 *l.* 14 *s.* 3 *d.* *Answer,* 27 yds. 3 qrs. $\frac{335}{1302}$.

21. If 3 *lb.* $\frac{1}{2}$ of *Cheshire* Cheese cost 1 *s.* 1 *d.* what cost 1 *cwt? Answer,* 1 *l.* 14 *s.* 8 *d.*

22. If 1 *cwt.* of *Cheshire* Cheese cost 1 *l.* 14 *s.* 8 *d.* what must I give for 3 *lb.* $\frac{1}{2}$? *Answer,* 1 *s.* 1 *d.*

23. Bought 1 *cwt.* 24 *lb.* 8 *oz.* of old Lead, at 9 *s. per cwt.* what does it come to? *Answer,* 10 *s.* 11 *d.* $\frac{1}{2}$. $\frac{112}{224}$.

24. If 1 *cwt.* 24 *lb.* 8 *oz.* of Lead be worth 10 *s.* 1 *d.* $\frac{1}{2}$, $\frac{112}{224}$. what is that *per cwt.?* *Answer,* 9 *s.*

25. If a Gentleman's Income is 500 *l.* a Year, and he spends 19 *s.* 4 *d. per* Day, how much does he lay by at the Year's End? *Answer,* 147 *l.* 3 *s.* 4 *d.*

26. If I buy 14 Yards of Cloth for 10 Guineas, how many Ells *Flemish* can I buy for 283 *l.* 17 *s.* 6 *d.* at the same Rate? *Answer,* 504 *Fl. Ells,* 2 qrs.

27. If 283 *l.* 17 *s.* 6 *d.* will buy 504 *Flemish* Ells, 2 Quarters, what Quantity of Yards can I have for 10 *l.* 10 *s.* *Answer,* 14 *yds.*

28. If 504 *Flemish* Ells, 2 Quarters cost 283 *l.* 17 *s.* 6 *d.* at what Rate must I give for 14 Yards? *Answ.* 10 *l.* 10 *s.*

29. Gave 1 *l.* 1 *s.* 8 *d.* for 3 *lb.* of Coffee, what must be given for 29 *lb.* 4 *oz. Answer,* 10 *l.* 11 *s.* 3 *d.*

30. Bought

30. Bought 29 *lb.* 4 *oz.* of Coffee for 10 *l.* 11 *s.* 3 *d.* what is the Value of 3 *lb. Anfwer,* 1 *l.* 1 *s.* 8 *d.*

31. If 1 *oz.* ½ of Coffee cost 6 *d.* ¼, what will 3 *oz.* ¾ cost at that Rate ? *Anfwer,* 1 *s.* 1 *d.* ½.

32. If 1 Ell *English,* 2 Quarters cost 4s. 7d. what will 39 Yards one half cost at the fame Rate ? *Anfwer,* 5 *l.* 3 *s.* 5 ¼.

33. If 1 Ounce of Gold is worth 5 *l.* 4 *s.* 2 *d.* what is the Worth of 1 Grain ? *Anfwer,* 2 *d.* ½. ⁴⁰⁄₄₈.

34. If 14 Yards of Broad Cloth cost 9 *l.* 12 *s.* what would be the Purchafe of 75 Yards ? *Anfwer,* 51 *l.* 8 *s.* 6 *d.* ¹²⁄₁₄.

35. If 27 Yards of Holland cost 5 *l.* 12 *s.* 6 *d.* how many Ells *English* can I buy for 100 *l. Anfwer,* 384.

36. If 1 *cwt.* cost 12 *l.* 12 *s.* 6 *d.* what muft I give for 14 *cwt.* 1 *qr.* 19 *lb.* ? *Anfwer,* 182 *l.* 0 *s.* 11 *d.* ⁵⁸⁄₁₁₂.

37. Bought 7 Yards of Cloth for 17 *s.* 8 *d.* what muft be given for 5 Pieces, each containing 27 Yards½. *Anf.* 17 *l.* 7 *s.* 0 *d.* ⁴⁄₁₄.

38. How many Chaldron of Coals can I have for 100 *l.* If I buy them at the Rate of 10 *d. per* Bufhel ?

Anfwer 66 *Chal.* 24 *Bufh.*

39. If I buy Corn for 4 *s.* the Bufhel, how many Quarters can I have for 40 Guineas ?

Anfwer, 26 *qrs.* 2 *Bufh.*

40. If 7 *oz.* 11 *dwt.* of Gold be worth 35 *l.* what is the Value of 14 *lb.* 9 *oz.* 12 *dwt.* 16 *gr.* at the fame Rate ?

Anfwer, 823 *l.* 9 *s.* 3 *d.* ¾. ⁵⁵²⁄₃₆₂₄.

41. If 21 Bufhels of Oats will ferve 6 Horfes for a Week, how many Bufhels will 20 Horfes confume in the fame Time ? *Anfwer* 70 *Bufhels.*

42. A Gentleman bought a Tankard for 10 *l.* 12 *s.* at the Rate of 5 *s.* 4 *d. per oz.* I defire to know what it weighed ? *Anfwer,* 39 *oz.* 15 *dwt.*

43. A Draper bought 420 Yards of Broad Cloth, at the Rate of 14 *s.* 10 *d.* ¾ *per* Ell *English,* how much did he pay for the whole? *Anfwer,* 250 *l.* 5 *s.*

44. A Goldfmith bought a Wedge of Gold, which weighed 14 *lb.* 3 *oz.* 8 *dwt.* for the Sum of 514 *l.* 4 *s.* at what Rate did he pay for it *per* Ounce? *Anfwer,* 3 *l.*

45. A Grocer bought 4 Hogfheads of Sugar, each weighing neat 6 *cwt.* 2 *qrs.* 14 *lb.* which cost him 2 *l.* 8 *s.* 6 *d. per cwt.* what is the Value of the 4 Hogfheads. *Anfwer,* 64 *l.* 5 *s.* 3 *d.*

46. A Draper bought 8 Packs of Cloth, each containing 4 Parcels, each Parcel 10 Pieces, and each Piece 26 Yards, and gave after the Rate of 4 *l.* 16 *s.* for 6 Yards, I defire to know what the 8 Packs ftood him in ? *Anfwer,* 6656 *l.*

47. If

47. If 24 *lb.* of Raisins cost 6 *s.* 6 *d.* what will 18 Frails cost, each weighing neat 3 *qrs.* 18 *lb.* ? *Answer,* 22 *l.* 8 *s.* 6 *d.*

48. If 1 *oz.* of Silver be worth 5 *s.* what is the Price of 14 Ingots, each weighing 7 *l.* 5 *oz.* 10 *dwt ? Anf.* 313 *l.* 5 *s.*

49. A Merchant hath owing to him 1000 *l.* and his Debtor doth agree to pay him 12 *s.* 6 *d.* in the Pound, I desire to know how much he will lose by him ? *Anf.* 375 *l.*

50. What is the Price of a Pack of Wool weighing 2 *cwt.* 1 *qr.* 19 *lb.* at 8 *s.* 6 *d. per* Stone ? *Answer,* 8 *l.* 4 *s.* 6 *d.* $\frac{6}{14}$.

The RULE of THREE INVERSE.

INVERSE PROPORTION is, when *more* requires *lefs,* and *lefs* requires *more. More* requires *lefs,* is when the third Term is *greater* than the *firft,* and requires the *fourth* Term, to be *lefs* than the *fecond.* And *lefs* requires *more,* is when the *third* Term is *lefs* than the *firft,* and requires the *fourth* Term to be *greater* than the *fecond.*

RULE. Multiply the firft and the fecond Terms together, and divide the Product by the third, the Quotient will bear fuch Proportion to the fecond as the firft does to the third ?

EXAMPLES.

1. If 8 Men can do a Piece of Work in 12 Days, how many Days can 16 Men perform the fame in ? *Anf.* 6 *days.*

$$8 : 12 : : 16 : 6$$
$$8$$

$$16)96(6 \ Days.$$

2. If 54 Men can build a Houfe in 90 Days, how many Men can do the fame in 50 Days ? *Anfw.* 97 *Men.* $\frac{1}{3}$.

3. If when a Peck of Wheat is fold for 2 *s.* the Penny Loaf weighs 8 *oz.* how much will it weigh when the Peck is worth but 1 *s.* 6 *d.* ? *Anfw.* 10 *oz.* 13 *dwt.* 8 *grs.*

4. How many Pieces of Money of 20 *s.* value are equal to 240 Pieces of 12 *s.* each ? *Anfw.* 144.

5. How many Yards of 3 Quarters Wide are equal in Meafure to 30 Yards of 5 Quarters wide ? *Answer,* 50.

6. If I lend my Friend 200 *l.* for 12 Months, how long ought he to lend me 150 *l.* to requite my Kindnefs ? *Anfwer,* 16 *Months.*

7. If for 24 *s.* I have 1200 *lb.* carried 36 Miles, how many Pounds can I have carried 24 Miles for the fame Money ? *Anfwer,* 1800 *lb.*

8. If

8. If 100 Workmen finifh a Piece of Work in 12 Days how many are fufficient to do it in 3 Days? *Anfwer,* 400.

9. An Army befieging a Town, in which were 1000 Soldiers, with Provifions for 3 Months, how many Soldiers departed when the Provifions lafted them 6 Months? *Anfwer,* 500.

10. If 20 *l.* worth of Wine is fufficient to ferve an Ordinary of 100 Men, when the Tun is fold for 30 *l.* how many will 20 *l.* worth fuffice, when the Tun is fold for but 24 *l.*? *Anfwer,* 125 Men.

11. How much Plufh is fufficient for a Cloak, which has in it 4 Yards of 7 Quarters wide of Stuff for the Lining, the Plufh being but 3 Quarters wide? *Anfwer,* 9 *Yards* $\frac{1}{3}$.

12. A Regiment of Soldiers confifting of 1000 Men are to have new Coats, each Coat is to contain 2 Yards $\frac{1}{2}$ of Cloth 5 Quarters wide, and to be lined with Shalloon of 3 Quarters wide, I demand how many Yards of Shalloon will line them? *Anfwer,* 4166 *Yards,* 2 *qrs.* $\frac{2}{3}$.

13. A Courier makes a Journey in 24 Days, when the Day is but 12 Hours long, how many Days will he be going the fame Journey, when the Days are 16 Hours long? *Anfwer,* 18 *Days.*

1 . How many Yards of Matting that is half Yard wide will cover a Room that is 18 Feet wide, and 30 Feet long? *Anfwer,* 120 Yards.

15. Borrowed of my Friend 64 *l.* for 8 Months, and he hath Occafion another Time to borrow of me for 12 Months, how much muft I lend him to requite his former Kindnefs to me? *Anfwer,* 42 *l.* 13 *s.* 4 *d.*

The DOUBLE RULE *of* THREE

IS fo called, becaufe it is compofed of 5 Numbers given to find a fixth, which if the Proportion is *direct*, muft bear fuch Proportion to the 4th and 5th as the 3d bears to the 1ft and 2d. But if *inverfe*, the 6th Term muft bear fuch Proportion to the 4th and 5th, as the 1ft bears to the 2d and 3d. The three firft Terms are a Suppofition, the two laft a Demand.

RULE 1. Let the principal Caufe of *Lofs* or *Gain, Intereft* or *Decreafe, Action* or *Paffion* be put in the firft Place.

2. Let that which betokeneth *Time,* Diftance of Place, and

and the like, in the second Place, and the remaining one in the third.

3. Place the other two Terms under their like in the Suppofition.

4. If the *Blank* falls under the *third* Term, multiply the *firft* and *fecond* Terms for a *Divifor*, and the other *three* for a *Dividend*. But,

5. If the *Blank* falls under the *firft* or *fecond* Term, multiply the *third* and *fourth* Terms, for a *Divifor*, and the other three for a *Dividend*, the *Quotient* will be the *Anfwer*.

Proof by two fingle Rules of Three.

EXAMPLES.

1. If 7 Quarters of Malt are fufficient for a Family of 7 Perfons for 4 Months, how many Quarters are enough for 46 Perfons 10 Months? *Anfwer*, 115 qrs.

By two fingle Rules.   or in one ftating.   worked thus.

perf. qrs.   perf. qrs.
1. *As* 7 : 7 :: 46 : 46 $\Big\}$ 7 . 4 . 7 $\dfrac{7 \times 46 \times 10}{7 \times 4}$ qrs. $= 115$
mo. qrs.   mo. qrs.
2. *As* 4 : 46 :: 19 : 115 $\Big\}$ 46 . 10 . —

2. If 7 Men can reap 84 Acres of Wheat in 12 Days, how many Men can reap 100 Acres in five Days?

Acr. men   Acr. men   men days acr.
1. *As* 84 : 7 :: 100 : $8\frac{23}{84+}$. $\Big\}$ 7 . 12 . 84 $\dfrac{7 \times 12 \times 100}{84 \times 5} = 20$ men
days men   days men
2. *As* 12 : $8\frac{28}{84+}$ :: 5 : 20 $\Big\}$ 5 . 100

3. If 100 *l.* in 12 Months gain 6 *l.* Intereft, how much will 75 *l.* gain in 9 Months? *Anfwer*, 3 *l.* 7 *s.* 6 *d.*

4. If a Carrier receives 2 *l.* 2 *s.* for the Carriage of 3 *cwt.* 150 Miles, how much ought he to receive for the Carriage of 7 *cwt.* 3 *qrs.* 14 *lb.* 50 Miles? *Anfwer*, 1 *l.* 16 *s.* 9 *d.*

5. If a Regiment of Soldiers confume 351 Quarters of Wheat in 108 Days, how many Quarters of Wheat will 11232 Soldiers confume in 56 Days? *Anfwer*, 15031.

6. If 40 Acres of Grafs be mowed by 8 Men in 7 Days, how many Acres can be mowed by 24 Men in 28 Days?
Anfwer, 480.

7. If 40 Shillings will pay 8 Men for 5 Days Work, how much will pay 32 Men for 24 Days Work?
Anfwer, 38 *l.* 18 *s.*

8. If 14 Horfes eat 56 Bufhels of Oats in 16 Days, how many Bufhels will be fufficient for 20 Horfes for 24 Days?
Anfwer, 120.

9. If 100 *l.* in 12 Months gain 6 *l.* Intereſt, what Principal will gain 3 *l.* 7 *s.* 6 *d.* in 9 Months ? *Anſwer* 75 *l.*

10. If a Regiment conſiſting of 939 Soldiers conſume 551 Quarters of Wheat in 168 Days, how many Soldiers will conſume 1404 Quarters in 56 Days? *Anſwer,* 11268.

11. In a Family conſiſting of 7 Perſons, there are drank out 2 Kilderkins of Beer in 12 Days, how many Kilderkins will there be drank out by another Family of 14 Perſons in 8 Days ? *Anſwer,* 2 *Kild.* 12 *Gal.*

12. If 8 Men in 14 Days can mow 112 Acres of Graſs, how many Men muſt there be to mow 2000 Acres in 10 Days ? *Anſwer,* 200.

13. If the Carriage of 60 *cwt.* 20 Miles coſt 14 *l.* 10 *s.* what Weight can I have carried 30 Miles for 5 *l.* 8 *s.* 9 *d.* at the ſame Rate of Carrriage ? *Anſwer,* 15 *cwt.*

14. If 2 Horſes eat 8 Buſhels of Oats in 16 Days, how many Horſes will eat up 3000 Quarters in 24 Days ? *Anſwer,* 4000.

PRACTICE

IS ſo called from the general Uſe thereof by all Perſons concerned in Trade and Buſineſs.

All Queſtions in this Rule are performed by taking aliquot or even Parts, by which means many tedious Reductions are avoided, the Table of which is as follows:

Of a Shilling. d.			*of a Ton.* cwt.			*of an Hund.* qrs. lbs.			*of a Quarter.* l.		
6	is	$\frac{1}{2}$	10	- -	$\frac{1}{2}$	2 or 56	-	$\frac{1}{2}$	14	- - -	$\frac{1}{2}$
4	- -	$\frac{1}{3}$	5	- -	$\frac{1}{4}$	1 or 28	-	$\frac{1}{4}$	7	- - -	$\frac{1}{4}$
3	- -	$\frac{1}{4}$	4	- -	$\frac{1}{5}$	14	-	$\frac{1}{8}$	4	- - -	$\frac{1}{7}$
2	- -	$\frac{1}{6}$	2$\frac{1}{2}$	- -	$\frac{1}{8}$	7	-	$\frac{1}{16}$	3$\frac{1}{2}$	- - -	$\frac{1}{8}$
1$\frac{1}{2}$	- -	$\frac{1}{8}$	2	- -	$\frac{1}{10}$	3$\frac{1}{2}$	-	$\frac{1}{32}$	2	- -	$\frac{1}{14}$
1	- -	$\frac{1}{12}$	1	- -	$\frac{1}{20}$				1	- - -	$\frac{1}{28}$
$\frac{3}{4}$	- -	$\frac{1}{16}$									
$\frac{1}{2}$	- -	$\frac{1}{24}$									
$\frac{1}{4}$	- -	$\frac{1}{48}$									

Of

Of a POUND *Sterling.*

s.	d.			s.	d.			d.		
10	0	- is	$\frac{1}{2}$	1	8	is	$\frac{1}{12}$	6	— is	$\frac{1}{40}$
6	8	-	$\frac{1}{3}$	1	4	—	$\frac{1}{15}$	5	—	$\frac{1}{48}$
5	0	- -	$\frac{1}{4}$	1	3	—	$\frac{1}{16}$	4	—	$\frac{1}{60}$
4	0	- -	$\frac{1}{5}$	1	0	—	$\frac{1}{20}$	3¾	—	$\frac{1}{64}$
3	4	-	$\frac{1}{6}$	0	10	—	$\frac{1}{24}$	3	—	$\frac{1}{80}$
2	6	- -	$\frac{1}{8}$	0	8	—	$\frac{1}{30}$	2½	—	$\frac{1}{96}$
2	0	- -	$\frac{1}{10}$	0	7½	—	$\frac{1}{32}$	2	—	$\frac{1}{120}$

RULE 1. *When the* Price *is less than a* Penny, *divide by the aliquot Parts that are in a* Shilling, *then by* 20, *and it will give the Answer.*

N. B. *The first Column contains the Money, the second the Parts*

$\frac{1}{4}$	$\frac{1}{48}$	5704 *lb.* at $\frac{1}{4}$ *per lb.*		6547 at $\frac{3}{4}$.
	20	118 10		*Facit* 20*l.* 9 *s.* 2 *d.*$\frac{1}{2}$
		5 *l.* 18*s.* 10*d.*		4573 at $\frac{3}{4}$.
		7695 *at* $\frac{1}{2}$ -		*Facit* 14 *l.* 5 *s.* 9 *d.*$\frac{1}{4}$
		Facit 16 *l.* 0*s.* 7 *d.* $\frac{1}{2}$		
		5740 *at* $\frac{1}{2}$		3754 at $\frac{3}{4}$.
		Facit 11 *l.* 19 *s.* 2 *d.*		*Facit* 11 *l.* 14 *s.* 7 $\frac{3}{4}$.

RULE 2. *When the* Price *is less than a* Shilling *take the aliquot Part or Parts that are in a* Shilling, *add them together and divide by* 20, *as before.*

1	$\frac{1}{12}$	7547 at 1 *d.*		54325 at 1 *d.*$\frac{1}{2}$.
	2|0	62|8 11 *d.*		*Facit* 339*l.* 10*s.* 7*d.*$\frac{3}{4}$
		31 *l.* 8 *s.* 11 *d.*		
1	$\frac{1}{12}$	3751 at 1 *d.* $\frac{1}{4}$.		6254 *at* 1 *d.*$\frac{3}{4}$.
		312 7		*Facit* 45 *l.* 12*s.* 0*d.*$\frac{1}{2}$
$\frac{1}{4}$	$\frac{1}{4}$	78 1$\frac{3}{4}$		
	2|0	39|0 8$\frac{3}{4}$.		2351 *at* 2 *d.*
		19*l.* 10*s.* 8*d.*$\frac{3}{4}$.		*Facit* 19 *l.* 11*s.* 10*d.*

7210 *at* 2 *d.* ¼.
Facit 67 *l.* 11*s.* 10*d.* ½.

2710 *at* 2 *d.* ½.
Facit 28 *l.* 4*s.* 7 *d.*

3250 *at* 2 *d.* ¾.
Facit 37 *l.* 4 *s.* 9*d.* ½.

2715 *at* 3 *d.*
Facit 33 *l.* 18*s.* 9*d.*

7062 *at* 3 *d.* ¼.
Facit 95 *l.* 12*s.* 7*d.* ½.

2147 *at* 3 *d.* ½.
Facit 31 *l.* 6*s.* 2*d.* ½.

7000 *at* 3 *d.* ¾.
Facit 109 *l.* 7*s.* 6*d.*

3257 *at* 4 *d.*
Facit 54 *l.* 5*s.* 8*d.*

2056 *at* 4 *d.* ¼.
Facit 36 *l.* 8*s.* 2*d.*

3752 *at* 4 *d.* ½.
Facit 70 *l.* 7*s.*

2107 *at* 4 *d.* ¾.
Facit 41 *l.* 14*s.* 0*d.* ¼.

3210 *at* 5 *d.*
Facit 66 *l.* 17*s.* 6*d.*

2715 *at* 5 *d.* ¼.
Facit 59 *l.* 7*s.* 9*d.* ¾.

3120 *at* 5 *d.* ½.
Facit 71 *l.* 10*s.*

7521 *at* 5 *d.* ¾.
Facit 180 *l.* 3*s.* 9*d.* ¾.

3271 *at* 6 *d.*
Facit 81 *l.* 15 *s.* 6*d.*

7914 *at* 6 *d.* ¼.
Facit 206 *l.* 1*s.* 10*d.* ½.

3250 *at* 6 *d.* ½.
Facit 88 *l.* 0 *s.* 5*d.*

2708 *at* 6 *d.* ¾.
Facit 76 *l.* 3 *s.* 3*d.*

3271 *at* 7 *d.*
Facit 95 *l.* 8 *s.* 1*d.*

3254 *at* 7 *d.* ½.
Facit 98 *l.* 5 *s.* 11*d.* ½.

2701 *at* 7 *d.* ½.
Facit 84 *l.* 8 *s.* 1*d.* ½.

3714 *at* 7 *d.* ¾.
Facit 119 *l.* 18 *s.* 7*d.* ½.

2710 *at* 8 *d.*
Facit 90 *l.* 6*s.* 8*d.*

3514 *at* 8 *d.* ¼.
Facit 120 *l.* 15*s.* 10 ½.

2759 *l. at* 8 *d.* ½.
Facit 97 *l.* 14 *s.* 3*d.* ½.

9872 *l. at* 8*d.* ¾.
Facit 359 *l.* 18 *s.* 4*d.*

5272 *at* 9 *d.*
Facit 197 *l.* 14*s.*

6325 *at* 9*d.* ¼.
Facit 243 *l.* 15 *s.* 6*d.* ¼.

7924 *at* 9*d.* ½.
Facit 313 *l.* 13 *s.* 2*d.*

2150 *at* 9*d*.¾.	7291 *at* 10*d*. ¾.
Facit 87 *l*. 6 *s*. 10*d*. ½	*Facit* 326*l*. 11 *s*. 6*d*.¼.
6325 *at* 10*d*.	3256 *at* 11*d*.
Facit 263 *l*. 10 *s*. 10 *d*.	*Facit* 149*l*. 4 *s*. 8 *d*.
5724 *at* 10 *d*. ¼.	7254 *at* 11*d*. ¼.
Facit 244*l*. 9 *s*. 3 *d*.	*Facit* 340*l*. 0 *s*. 7*d*. ½.
6327 *at* 10 *d*. ¼.	3754 *at* 11*d*. ½.
Facit 270 *l*. 4 *s*. 3 *d*.¾	*Facit* 179*l*. 17 *s*. 7*d*.
3254 *at* 10 *d*. ½.	7972 *at* 11 *d*. ¾.
Facit 142*l*. 7 *s*. 3 *d*.	*Facit* 390 *l*. 5 *s*. 11*d*.

RULE 3. *When the* Price *is more than a* Shilling, *and less than* two, *take the Part or Parts with so much of the given* Price *as is more than a* Shilling, *which add to the given* Quantity, *and divide by* 20, *it will give the* Answer.

¼ ·¹⁄₄₈	2106 *at* 12 *d*. ¼.	2790 *at* 1 *s*. 1 *d*. ½.
	43 10½.	*Facit* 156 *l*. 18 *s*. 9*d*.
2|0	214|9 10½.	7904 *at* 1 *s*. 1 *d*. ¾.
		Facit 452*l*. 16 *s*. 8 *d*.
	107 *l*. 9 *s*. 10*d*.½.	5750 *at* 1 *s*. 2 *d*.
½ ·¹⁄₂₄	3715 *at* 12 *d*. ½.	*Facit* 218 *l*. 15 *s*.
	154 9½.	3291 *at* 1 *s*. 2 *d*. ¼.
2|0	386|9 9½.	*Facit* 195*l*. 8 *s*. 0*d*.¼.
	193 *l*. 9 *s*.9*d*.½.	9254 *at* 1 *s*. 2*d*. ½.
		Facit 559 *l*. 1 *s*. 11*d*.
	2712 *at* 12*d*.¾.	7250 *at* 1 *s*. 2 *d*. ¾.
	Facit 144 *l*. 1 *s*. 6*d*.	*Facit* 445 *l*. 11 *s*. 5*d*.½
	2107 *at* 1 *s*. 1*d*.	7591 *at* 1 *s*. 3*d*.
	Facit 114 *l*. 2 *s*.7*d*.	*Facit* 474 *l*. 8 *s*. 9*d*.
	3215 *at* 1 *s*. 1*d*. ¼.	
	Facit 177 *l*. 9 *s*. 10*d*.¾.	

6325 *at* 1 s. 3d.¼. *Facit* 401 *l.* 18s. ¼.	9271 *at* 1s. 7d. *Facit* 733*l.* 19s. 1d.
5271 *at* 1s. 3d.½. *Facit* 340 *l.* 8s. 4d.½.	7210 *at* 1s. 7d.¼. *Facit* 578*l.* 6s. 0d.½.
3254 *at* 1s. 3d.¾. *Facit* 213*l.* 10s. 10d.½	2310 *at* 1s. 7d.½. *Facit* 187*l.* 13s. 9d.
2915 *at* 1s. 4d. *Facit* 194*l.* 6s. 8d.	2504 *at* 1s. 7d.¾. *Facit* 206*l.* 1s. 2d.
3270 *at* 1s. 4d. ¼. *Facit* 221*l.* 8s. 1d.½.	7152 *at* 1s. 8d. *Facit* 596*l.*
7059 *at* 1s. 4d.½. *Facit* 485 *l.* 6s. 1d.½.	2905 *at* 1s. 8d. ¼. *Facit* 245 *l.* 2s. 2d.¼.
2750 *at* 1s. 4d.¾. *Facit* 191 *l.* 18 s. 6d.½.	7104 *at* 1s. 8d .½. *Facit* 606*l.* 16s.
3725 *at* 1s. 5d. *Facit* 263*l.* 17s. 1d.	1004 *at* 1s. 8d. ¾. *Facit* 86*l.* 16s. 1d.
7250 *at* 1s. 5 d. ¼. *Facit* 521 *l.* 1s. 10d.½.	2104 *at* 1s. 9d. *Facit* 184*l.* 2s.
2597 *at* 1s. 5d.½. *Facit* 189*l.* 7s. 3d.½.	2571 *at* 1s. 9d.¼. *Facit* 227*l.* 12s. 9d.¾.
7210 *at* 5d.¾. *Facit* 533*l.* 4s. 9d.½.	2104 *at* 1s. 9d.½. *Facit* 188*l.* 9s. 8d.
7524 *at* 1s. 6d. *Facit* 564*l.* 6s.	7506 *at* 1s. 9d.¾. *Facit* 680*l.* 4s. 7d.½.
7103 *at* 1s. 6d.¼. *Facit* 540 *l.* 2s. 5d.¾.	1071 *at* 1s. 10d. *Facit* 98 *l.* 3s. 6d.
3254 *at* 1s. 6d.½. *Facit* 250*l.* 16s. 7d.	5200 *at* 1s. 10d.¼. *Facit* 482 *l.* 1s. 8d.
7925 *at* 1s. 6d.¾. *Facit* 619*l.* 2s. 9d.¾.	2117 *at* 1s. 10d.½. *Facit* 198*l.* 9s. 4d.½.

F

1007 *at* 1s. 10d. ¾.
Facit 95l. 9s. 1d. ¼.

1006 at 1s. 11d. ½
Facit 98l. 10s. 1d.

5000 *at* 1s. 11d.
Facit 479l. 3s. 4d.

2705 at 1s. 11d. ¾.
Facit 267l. 13s. 7d. ¾.

2105 at 1s. 11d. ¼.
Facit 203l. 18s. 5d. ¼.

RULE 4. *When the* Price *consists of any even Number of* Shillings *under* 20, *multiply the given* Quantity *by Half the* Price, *doubling the first Figure of the Product for* Shillings, *and the rest of the Product will be Pounds.*

2750 at 2s.
Facit 275l. 0s.

2101 at 12s.
Facit 1260l. 12s.

3254 at 4s.
Facit 650l. 16s.

5271 at 14s.
Facit 3689l. 14s.

2710 at 6s.
Facit 813l. 0s.

3123 at 16s.
Facit 2498l. 8s.

1572 at 8s.
Facit 628l. 16s.

1075 at 16s.
Facit 860l.

2102l. at 10s.
Facit 1051l.

1621 at 18s.
Facit 1458l. 18s.

Note, *When the* Price *is* 10s. *take Half of the Quantity, and if any remains, it is* 10s.

RULE 5. *When the* Price *consists of odd* Shillings, *multiply the given* Quantity *by the* Price, *and divide by* 20, *the Product will be the Answer.*

2703 at 1s.
Facit 135l. 3s.

3271 at 5s.
Facit 817l. 15s.

3270 at 3s.
3.

2715 at 7s.
Facit 950l. 5s.

2'0 981|0

490l. 10s.

3214 at 9s.
Facit 1446l. 6s.

2710 *at* 11 *s.*
Facit 1490 *l.* 10 *s.*

3142 *at* 17 *s.*
Facit 2670 *l.* 14 *s.*

3179 *at* 13 *s.*
Facit 2066 *l.* 7 *s.*

2150 *at* 19 *s.*
Facit 2042 *l.* 10 *s.*

2150 *at* 15 *s.*
Facit 1612 *l.* 10 *s.*

7157 *at* 19 *s.*
Facit 6799 *l.* 3 *s.*

RULE 6. *When the* Price *is* Shillings *and* Pence, *and they the Aliquot Part of a* Pound, *divide by the Aliquot Part, and it will give the Answer at once; but if they are not an Aliquot Part, then multiply the Quantity by the Shillings, and take Parts for the rest, add them together, and divide by 20.*

s.	d.		
6	8	$\frac{1}{3}$	2710 *at* 6 *s.* 8 *d.*

903 *l.* 6 *s.* 8 *d.*

7514 *at* 4 *s.* 7 *d.*
Facit 1721 *l.* 19 *s.* 2 *d.*

3150 *at* 3 *s.* 4 *d.*
Facit 525 *l.*

2517 *at* 5 *s.* 3 *d.*
Facit 660 *l.* 14 *s.* 3 *d.*

2715 *at* 2 *s.* 6 *d.*
Facit 339 *l.* 7 *s.* 6 *d.*

1570 *at* 6 *s.* 4 *d.*
Facit 497 *l.* 3 *s.* 4 *d.*

7150 *at* 1 *s.* 8 *d.*
Facit 595 *l.* 16 *s.* 8 *d.*

2547 *at* 7 *s.* 3 *d.* $\frac{1}{2}$.
Facit 928 *l.* 11 *s.* 10 *d.* $\frac{1}{2}$.

3215 *at* 1 *s.* 4 *d.*
Facit 214 *l.* 6 *s.* 8 *d.*

3271 *at* 5 *s.* 9 *d.* $\frac{1}{4}$.
Facit 943 *l.* 16 *s.* 4 *d.* $\frac{3}{4}$.

7211 *at* 1 *s.* 3 *d.*
Facit 450 *l.* 13 *s.* 9 *d.*

2103 *at* 15 *s.* 4 *d.* $\frac{1}{2}$.
Facit 1616 *l.* 13 *s.* 7 *d.* . $\frac{1}{2}$

d.			
2		$\frac{1}{6}$	2710 *at* 3 *s.* 2 *d.*

3

8130

45 1 8

858 | 1 *s.* 8 *d.*

429 *l.* 1 *s.* 8 *d.*

7152 *at* 17 *s.* 6 *d.* $\frac{3}{4}$.
Facit 6280 *l.* 7 *s.*

2510 *at* 14 *s.* 7 *d.* $\frac{1}{4}$.
Facit 1832 *l.* 16 *s.* 5 *d.* $\frac{1}{2}$.

3715 *at* 9 *s.* 4 *d.* $\frac{1}{2}$.
Facit 1741 *l.* 8 *s.* 1 *d.* $\frac{1}{2}$.

| 2572 at 13s. 7d. ½. | 3210 at 15s. 7d. ¾ |
| Facit 1752l. 3s. 6d. | Facit 2511l. 3s. 1d. ½. |

| 7251 at 14s. 8d. ¾. | 2710 at 12s. 2d. ½. |
| Facit 5324l. 19s. 0d. ¾ | Facit 2602l. 14s. 7d. |

RULE 7. 1*st*. *When the* Price *is* Pounds *and* Shillings, *multiply the Quantity by the* Pounds, *and proceed with the* Shillings, *if they are even, as in the* 4th Rule, *if odd, take the Aliquot Parts, add them together, the Sum will be the Answer.*

2*dly*. *When* Pounds, Shillings, *and* Pence, *and the* Shillings *and* Pence *the aliquot Part of a* Pound, *multiply the Quantity by the* Pounds, *and take Parts for the rest.*

3*dly*, *When the* Price *is* Pounds, Shillings, Pence *and* Farthings, *and the* Shillings *and* Pence *not the Aliquot Parts of a* Pound, *reduce the* Pounds *and* Shillings *into* Shillings, *multiply the Quantity by the* Shillings, *take Parts for the rest, add them together, and divide by* 20.

Note. *When the given Quantity is no more than three Figures, proceed as in* Compound Multiplication.

4	⅓	7215 at 7l. 4s.	6	½	2710 at 2l. 3s 7d½.
		7			43
		50505			8130
		1443			10840
		51948 l.			116530
s. d.			1d.½	¾	1355
2 6	⅛	2104 at 5l. 3s.			338.9
		5		2│0	11822│3.9
		10520			
		263			5911. 3. 9.
6	⅕	52. 12			
					3215 at 1l. 17s.
		10835 12			Facit 5947 l. 15s.
		2107 at 2l. 8s.			2107 at 1l. 13s.
		Facit 5056l. 16s.			Facit 3476l. 11s.
		7156 at 5l. 6s.			
		Facit 37926l. 16s.			

3215 *at* 4*l*. 6*s*. 8*d*. *Facit* 13931*l*. 13*s*. 4*d*.	2157 *at* 2*l*. 7*s*. 4*d*. $\frac{1}{2}$. *Facit* 5109*l*. 7*s*. 10*d*. $\frac{1}{2}$.
2154 *at* 7*l*. 1*s*. 3*d*. *Facit* 15212*l*. 12*s*. 6*d*.	142 *at* 1*l*. 15*s*. 2*d*. $\frac{3}{4}$. *Facit* 250*l*. 2*s*. 6*d*. $\frac{1}{2}$.
2701 *at* 2*l*. 3*s*. 4*d*. *Facit* 5852*l*. 3*s*. 4*d*.	95 *at* 15*l*. 14*s*. 7*d*. $\frac{1}{4}$. *Facit* 1494*l*. 7*s*. 4*d*. $\frac{3}{4}$.
2715 *at* 1*l*. 17*s*. 2*d*. $\frac{1}{2}$. *Facit* 5051*l*. 9*s*. 7*d*$\frac{1}{2}$,	37 *at* 1*l*. 19*s*. 5*d*.$\frac{1}{4}$. *Facit* 73*l*. 0*s*. 8*d*. $\frac{3}{4}$.
'157 *at* 3*l*. 15*s*. 2*d*. $\frac{1}{4}$. *Facit* 8108*l*. 19*s*. 5*d*.$\frac{1}{4}$.	2175 *at* 2*l*. 15*s*. 4*d*. $\frac{1}{2}$. *Facit* 6022*l* 0*s*. 7*d*. $\frac{1}{2}$.
3210 *at* 1*l*. 18*s*. 6*d*. $\frac{3}{4}$. *Facit* 6189*l*. 5*s*. 7*d*. $\frac{1}{2}$.	2150 *at* 17*l*. 16*s*. 1*d*. $\frac{1}{2}$. *Facit* 38283*l*. 8*s*, 9*d*.$\frac{1}{2}$.

RULE 8. *When the* Price *and Quantity given are of several* Denominations, *multiply the* Price *by the* Integers, *and take* Parts *with the Parts of the* Integer *for the rest.*

At 3*l*. 17*s*. 6*d*. *per Cent*. what is the Value of 25 *cwt*. 2 *qrs*. 14 *lb*. of Tobacco ?

```
qrs.
 2 │ ½ │  3l. 17s.  6d.          5 × 5 = 25
   │   │            5
   │   │  ───────────
   │   │  19   7    6
   │   │            5
lb.│   │  ───────────
   │   │  96  17    6
14 │ ¼ │   1  18    9
   │   │       9   8¼
   │   │  ───────────
   │   │  99   5  11¼
```

2. At 1*l*. 4*s*. 9*d*. *per cwt*. what comes 17 *cwt*. 1 *qr*. 17 *lb*. of Cheese to ? *Answer* 21*l*. 10*s*. 8*d*.

3. Sold 85 *cwt*. 1 *qr*. 10 *lb*. of Cheese at 1*l*. 7*s* 8*d*. *per Cwt*. what does it come to ? *Answer* 118*l*. 1*s*. 0*d*. $\frac{1}{2}$.

4. Hops at 4*l*. 5*s*. 8*d*. *per cwt*. what must be given for 72 *cwt*. 1 *qr*. 18 *lb*. *Answer*, 310*l*. 3*s*. 2*d*.

5. At 1*l.* 1*s.* 4*d. per cwt.* what is the Value of 27 *cwt.* 2 *qrs.* 15 *lb.* of *Malaga* Raiſins ? *Anſwer,* 29*l.* 9*s.* 6*d.* ¼.

6. Bought 78 *cwt.* 3 *qrs.* 12 *lb.* of Currants at 2*l.* 17*s.* 9*d. per cwt.* what did I give for the whole ? *Anſw.* 227*l.* 14*s.*

7. Sold 56 *cwt.* 1. *qr.* 17*lb.* of Sugar, at 2*l.* 15*s.* 9*d.* the *cwt.* what does it come to ? *Anſwer,* 157*l.* 4*s.* 4*d.* ½.

8. Tobacco at 3*l.* 17*s.* 10*d.* the *cwt.* what is the Worth of 97 *cwt.* 0 *qrs.* 15 *lb.* ? *Anſwer,* 378*l.* 0*s.* 3*d.*

9. At 4*l.* 14*s.* 6*d.* the *cwt.* what is the Value of 37 *cwt.* 2 *qrs.* 13 *lb.* of double refined Sugar ?
Anſwer, 177*l.* 14*s.* 8*d.* ½.

10. Bought Sugar at 3*l.* 14*s.* 6*d.* the *cwt.* what did I give for 15 *cwt.* 1*qr.* 10*lb. Anſwer,* 57*l.* 2*s.* 9*d.*

11. At 4*l.* 15*s.* 4*d.* the *cwt.* the Value of 172 *cwt.* 3*qrs.* 12*lb.* of Tobacco is required ? *Anſwer,* 823*l.* 19*s.* ¼.

12. Soap at 3*l.* 11*s.* 6*d.* the *cwt.* what is the Value of 53 *cwt.* 0 *qrs.* 17*lb.* ? *Anſwer,* 190*l.* 0*s.* 4*d.*

INTEREST.

INTEREST is either *Simple* or *Compound.*

SIMPLE INTEREST

IS the PROFIT allowed in the lending or Forbearance of any Sum of Money for a determined Space of *Time.*

The PRINCIPAL is the Money lent, for which *Intereſt* is to be received.

The RATE *per* CENT. is a certain *Sum* agreed on between the *Borrower* and the *Lender,* to be paid for every 100*l.* for the Uſe of the *Principal,* 12 Months.

The AMOUNT is the *Principal* and *Intereſt* added together.

Intereſt is alſo applied to *Commiſſion, Brokage, Purchaſing of Stocks* and *Inſurance.*

To find the Intereſt of any Sum of Money for a Year.

RULE 1. Multiply the *Principal* by the *Rate per Cent.* that Product divided by 100, will give the Intereſt requir'd.

For ſeveral Years.

Multiply the *Intereſt* of one *Year* by the Number of *Years* given in the Queſtion, and the Product will be the *Anſwer.*

E x-

EXAMPLES.

1. What is the Interest of 375*l.* for a Year, at 5*l. per Cent. per Annum?*

Answ. 18*l.* 15*s.*

$$375$$
$$5$$
$$\overline{18|75}$$
$$20$$
$$\overline{15|00}$$

2. What is the Interest of 268*l.* for one Year at 4*l. per Cent. per Annum? Answ.* 10*l.* 14*s.* 4*d.* ¾.

3. What is the Interest of 945*l.* 10*s.* for a Year, at 4*l. per Cent. per Annum? Answ.* 37*l.* 16*s.* 4*d.*¾.

4. What is the Interest of 547*l.* 15*s.* at 5*l. per Cent. per Annum,* for 3 Years? *Answ.* 82*l.* 3*s.* 3*d.*

5. What is the Interest of 254*l.* 17*s.* 6*d.* for 5 Years, at 4*l. per Cent. per Annum? Answ.* 50*l.* 19*s.* 5*d.*¼.

6. What is the Amount of 556*l.* 13*s.* 4*d.* at 5 per Cent. *per Annum,* for 5 Years? *Answ.* 139*l.* 3*s.* 4*d.*

COMMISSION

Is an Allowance from *Merchants* to their *Factors* or *Correspondents* in the buying or selling of Goods, and is generally at a certain *Rate per Cent.* according to the Custom of the Country, where the *Factor* resides.

RULE. Multiply the *Principal* by the *Rate per Cent.* as before; and for ¼, ½, or ¾, take the *Part* or *Parts* from the *Principal,* which add to the Product, and divide by 100, will give the *Answer.*

7. What is the Commission of 287*l.* 10*s.* at 3½ per Cent.

Answ. 10*l.* 1*s.* 3*d.*

$$237 \quad 10$$
$$3$$
$$\overline{\qquad}$$
$$862 \cdot 10$$
$$\tfrac{1}{2} \quad \tfrac{1}{2} \quad 143 \quad 15$$
$$\overline{\qquad}$$
$$10|06 \quad 5$$
$$20$$
$$\overline{\qquad}$$
$$1|25$$
$$12$$
$$\overline{\qquad}$$
$$3|00$$

8. What

8. What muſt I allow my Correſpondent for diſburſing on my Account 529*l*. 18*s*. 5*d*. at 2 ¼ *per Cent*. *Anſw.* 11 *l*. 18*s*. 5*d*. ½.

9. My Correſpondent writes me Word, that he has bought Goods to the Amount of 754*l*. 16*s*. on my Account, what does his Commiſſion come to at 2½ *per Cent*.? *Anſw.* 18*l*. 17*s*. 4*d*. ¾.

10. If I allow my Factor 3 ¾. *per Cent*. for Commiſſion, what may he demand on the laying out of 876*l*. 5*s*. 10*d*. *Anſw.* 32*l*. 17*s*. 2*d*. ½.

PURCHASING of STOCKS, &c.

Rule. Multiply the *Sum* to be purchaſed by the Exceſs, above 100, that Product divide by 100, the Produce of which added to the given *Sum* is the *Purchaſe* required.

If under *Par*, multiply by the *Rate per Cent*. that Product divided by 100, gives the *Purchaſe* thereof.

11. What is the Purchaſe of 575*l*. 10*s*. Bank Stock, at 131 ¾ *per Cent*.

½ ½ 575 10   6×5+1=31.
        6

     3453
       5

    17265
     575 10
¾ ½ 287 15
     143 17 6

   182|72   2 6
      20

   14|42
     12

    5|10

575 10 0
182 14 5

758 4 5 *Anſw.*

12. What is the Purchaſe of 254*l*. 17*s*. Bank Annuities, at 97 ¼ *per Cent*.

¼ ¼ 254 17   12×8+×=97.
        12

    3058 4
       8

   24465 12
    254 17
     63 14 3

  247|84 3 3
    20

   16|83
    12

    9|99
     4

    3|96

247 16 9 ¾. *Anſw.*

13. At 110¼ *per Cent.* what is the Purchase of 2054*l.* 16*s.* *South* Sea Stock ? *Answer* 2265*l.* 8*s.* 4*d.*

14. At 104*l.* ⅞ *per Cent.* South Sea New Annuities, what is the Purchase of 1797*l.* 14*s.* ? *Answer* 1876*l.* 6*s.* 11*d.* ¾.

15. What is the Purchase of 2750*l.* 17*s.* South Sea Old Annuities, at 102 ⅝ *per Cent.* ? *Answ.* 2823*l.* 1*s.* 2*d*¼.

16. At 96*l.* ¾ *per Cent.* what is the Purchase of 577*l.* 19*s.* Bank Annuities *Answ.* 559*l.* 3*s* 3*d.* ¾.

17. At 124⅝ *per Cent.* what is the Purchase of 758*l.* 17*s.* 10*d.* India Stock ? *Answ.* 945*l.* 15*s.* 4*d.* ¼.

BROKAGE

Is an Allowance to *Brokers* for helping *Merchants* or *Factors* to Persons to buy or sell them Goods.

RULE. Divide the given Sum by 100, and take Parts from the Quotient with the *Rate per Cent.* ?

18. If I employ a Broker to sell Goods for me to the Value of 2575*l.* 17*s.* 6*d.* what is the Brokage at 4*s. per Cent* ?

```
25|75  17 6
   20                4s. ⅕        25  15  2

  15|17                            5   3  0¼.
     12

   2|10
```

19. What is the Brokage of 796*l.* 14*s.* 7*d.* at 6*s. per Cent.* ? *Answer*, 2*l.* 7*s.* 9*d.* ½.

20. When a Broker sells Goods to the Amount of 7105*l.* 5*s.* 10*d.* what may he demand for Brokage, if he is allow'd 5*s.* 6*d. per Cent.* ? *Answer* 19*l.* 10*s.* 9*d.* ¼.

21. If a Broker is employed to buy a Quantity of Goods to the Value of 975*l.* 6*s.* 4*d.* what is the Brokage at 6*s.* 6*d. per Cent.* ? *Answer*, 3*l.* 3*s.* *d.*½.

When the Time is for ¼, ½, *or* ¾ *of a Year, besides a Number of Years given.*

RULE. Take Parts of the *Interest* of one *Year* which add to the *Interest* of the several *Years* given, and it will give the *Answer.*

22. What is the Interest of 554*l.* 10*s.* for 3 Months, at 4 *per Cent. per Annum* ?

23. What is the Interest of 336*l.* 15*s.* 6*d.* for 2 Years ¾, at 5 *per Cent. per Annum* ?

```
554   10                    336  15   6
      4                              5
------                      ------
22|18    m.                 16|83  17  6
   20    3¼  22  3  7           20
------                      ------
3|60 Answ.  5  10  10¾      16|77
  12                          12
------                      ------
7|20                        9|30  .
                               4
                            ------
                            1|20      ½  ½   16  16  9¼
                                                      2

                                      ¼  ½   33  13  6½
                                               8   8  4½
                                               4   4  2¼
                                             ------
                                             46      9  1¼
```

23. What is the Interest of 325*l.* 7*s.* 6*d.* at 6 *per Cent. per Annum*, for 3 Years and a Half ? *Answ* 68*l.* 6*s.* 6*d.*¼.

24. What is the Interest of 547*l.* 2*s.* 4*d.* for 5 Years and a Half, at 4 *per Cent. per Annum? Answ.* 120*l.* 7*s.* 3*d.*¼.

25. What is the Interest of 257*l.* 5*s.* 1*d.* at 4 *per Cent.* for 1 Year and three Quarters ? *Answ.* 18*l.* 0*s.* 1*d.*½.

26. What is the Interest of 479*l.* 5*s.* for 5 Years, one Quarter, at 5 *per Cent. per Annum? Answer,* 125*l.* 16*s.* 0*d.*¼
When the Rate per Cent. *is* ¼, ½, *or* ¾ *more than the Pounds given in the Rate,* proceed as in Commiſſion, and it will give the *Anſwer* for one *Year,* and for *ſeveral* proceed as in the laſt Rule.

27. What is the Intereſt of 175*l.* 17*s.* for 2 Years and 3 Quarters, at 4½ *per Cent. ?*

```
½  ½   175  17                    ½  ½   7  18  3
            4                                   2
       ------                            ------
       703   8                           15   6  6
        87  18  6                 ¼  ½    3  19  1½
       ------                             1  19  6¾
       7|91   6  6                       ------
         20                              21   5  2¼  Anſwer.
       ------
       18|26
         12
       ------
        3|18
```

28.

28. What is the Interest of 397*l.* 9*s.* 5*d.* for 2 Years and one Quarter, at 3½ *per Cent. per Annum? Anf.* 31*l.* 5*s.* 11*d.* ½.

29. What is the Interest of 576*l.* 2*s.* 7*d.* for 7 Years one Quarter, at 4½ *per Cent. per Annum? Anfwer,* 187*l.* 19*s.* 1*d.* ½.

30. What is the Interest of 279*l.* 13*s.* 8*d.* at 5¼ *per Cent. per Annum,* for 3 Years and a Half? *Anfwer* 51*l.* 7*s.* 10*d.*

When the Interest is required for any Number of Weeks.

RULE. As 52 *Weeks* : are to the *Interest* of the given *Sum* for a Year : : fo are the Weeks given : to the Interest required.

31. What is the Interest of 379*l.* 13*s.* 2*d.* for 4 Weeks, at 4 *per Cent. per Annum?*

```
     w.              w.
As 52 : 15 3 8½ : : 4 :        379 13 2
         20                           4
                              _____
        303                   15|18 12 8
         12                        20
        ____                  _____
       3644                   317²
          4                     12
        ____                  _____
      14578                    8|70
          4                       4
        ____   4)              _____
  52)58312(1120               2|80
       52
       __   12)280        Or thus: multiply by the
       63                 Number of Weeks, and divide
       52     2|3 4       the Product by 4 and 13, being
       __               4×13=52     13)15 3 8½
      111     1 3 4                 _____
      104                            1  3 4¼
      ____              N.B. As it is 4 Weeks, I don't
        7                  multiply, but only divide
                           by 13.
```

32. What is the Interest of 239 *l.* 13*s.* 5*d.* for 20 Weeks, at 5 *per Cent. per Annum? Anfwer,* 4*l.* 19*s.* 10*d.* ¼.

33. What is the Amount of 375*l.* 6*s.* 1*d.* for 12 Weeks, at 4½ *per Cent. per Annum? Anfwer,* 379*l.* 4*s.* 0*d.* ¼.

34. What is the Amount of 256*l.* 5*s.* 3*d.* for 25 Weeks, at 2¾ *per Cent. per Annum? Anfwer,* 259*l.* 13*s.*

When the Intereſt is for any Number of Days.

RULE. Multiply the *Pence* of the *Principal* by the *Days* and *Rate per Cent*, for a Dividend, cut off two Figures on the Right Hand, and divide by 365, the Quotient will be the *Anſwer* in Pence.

As 365 *Days* : are to the *Intereſt* of the given Sum for a Year, :: ſo are the *Days* given : to the *Intereſt* required.

35. What is the Intereſt of 240*l.* for 120 Days at 4 *per Cent. per Ann?*

```
        240                          240
        240                            4
      -------                       ------
       57600                         9|60
        120                           20
      -------                       ------
      691 2000                      12|00
          4                    As 365 : 9. 12 :: 120 :
     ----------  12)                   20
365)276480|00(757                     ---
     2555                              192
     ----        2|0)6| 3. 1          120
     2098        ----------        ------- 2|0
     1825        3. 3. 1¼.      365)23040(6|3
     ----                           2190      -------
     2730                          ------- 3. 3. 1. ¼
     2555                           1140
     ----                           1095
      175                          ------
        4                            45
     ------                          12
     )700(1                        ------
      365                          )540|1
     ------                         365
      335                         ------
                                   175
                                     4
                                  ------
                                  )700(1
                                   365
                                  ------
                                   335
```

36. What is the Intereſt of 397*l.* 5*s.* 4*d.* for 3 Years, and 75 Days at 5*l. per Cent. per Annum? Anſwer,* 63*l.* 13*s.* 5*d.*

37. At 5½ *per Cent. per Annum,* what is the Intereſt of 985*l.* 2*s.* 7*d.* for 5 Years, 127 Days? *Anſwer,* 289*l.* 15*s.* 3*d.*

38. What is the Intereſt of 2726 *l.* 1*s.* 4*d.* at 4½ *per Cent. per Annum* for 3 Years 154 Days? *Anſwer,* 419*l.* 15*s.* 6*d.* ½.

When the Amount, Time and Rate per Cent. given to find the Principal.

RULE. As the *Amount* of 100*l.* at the *Rate* and *Time* given : is to 100*l.* :: ſo is the *Amount* given : to the *Principal* required.

39. What Principal being put to Intereſt will amount to 402*l.* 10*s.* in 5 Years Time at 3 *per Cent. per Annum?*

$$3 \times 5 + 100 = 115l. : 100 :: 402 \quad 10$$
$$ 20 20$$

$$2300 8050$$
$$ 100$$

$$23|00)8050|00(350l.$$
$$69$$

$$115$$
$$115$$

$$\ldots 0$$

40. What Principal being put to Intereſt for 9 Years will amount to 734*l.* 8*s.* at 4 *per Cent per. Ann? Anſwer* 540 *l.*

41. What Principal being put to *Intereſt* for 7 Years at 5 *per Cent. per Annum,* will amount to 334*l.* 16*s. Anſ.* 248*l.*

When the Principal, Rate per Cent. and Amount are given to find the Time.

RULE. As the *Intereſt* of the *Principal* for one Year : is to 1 Year :: ſo is the whole *Intereſt* to the *Time* required.

42. In what Time will 350*l.* amount to 402*l.* 10*s.* at 3 *per Cent. per Annum? As* 10 10 : 1 :: 52 10

$$350 20 20$$
$$3$$
$$ \overline{} 210 \quad 21|0)105|0(5$$
$$10|50 105 402 \quad 10$$
$$20 \overline{} 350$$
$$\overline{} \ldots \overline{}$$
$$10|00 52 \quad 10$$

43. In what Time will 540*l*. amount to 734*l*. 8*s*. at 4 *per Cent. per Annum? Anfwer* 9 *Years.*

44. In what Time will 248*l*. amount to 334*l*. 16*s*. at 5 *per Cent. per. Annum? Anfwer,* 7 Years.

When the Principal, Amount, and Time are given to find the Rate per Cent.

RULE. As the *Principal:* is to the *Interest* for the whole *Time* :: fo is 100*l*: to the *Interest* for the fame Time. Divide that *Interest* by the *Time,* and the Quotient *will be* the *Rate per Cent.*

45. At what *Rate per Cent.* will 350*l*. amount to 402*l*. 10*s*. in 5 Years Time?

$$As\ 350 : 52\ 10 :: 100 : 15l.$$

```
             20                      350
          ────────                 ────────
          1050                       52  10
             100    2|0)        5)15
          ────────               ─────────
       35|0)10500|0( 30|0        3 per Cent.
          105          ───
          ────          15
```

46. At what Rate *per Cent.* will 248*l*. amount to 334*l*. 16*s*. in 7 Years Time? *Anfwer,* 5 *per Cent.*

47. At what *Rate per Cent.* will 540*l*. amount to 734*l*. 8*s*. in 9 Years Time? *Anfwer,* 4 *per Cent.*

Compound INTEREST

Is that which arifes both from the *Principal* and *Interest,* that is, when the *Interest* on Money becomes due, and not paid, the fame *Interest* is allowed on that *Interest* unpaid, as was on the *Principal* before.

RULE. 1. Find the firft Year's *Interest,* which add to the *Principal,* then find the *Interest* of that *Sum,* which add as before, and fo on for any Number of Years.

2. Subtract the given *Sum* from the laft *Amount,* and it will give the *Compound Interest* required.

EXAMPLES.

1. What is the Compound Intereft of 500*l*. forborne 3 Years at 5 *per Cent. per Annum?*

500

500	500	525	551 5
5	25	26. 5	27 11 3

25|00	525 1*st* year.	551. 5 2*d. Year*	578 16 3 3*d. Year*
	5	5	500 *Prin. subtracted*

	26|25	27|56. 5	78 16 3 = *Inter. for*
	20	20	3 *Years.*

	5|00	11|25
		12

3\|00

2. What is the Amount of 400*l.* forborne 3 Years and ½, at 6 *per Cent. per Annum* Compound Interest ?
Answer, 490*l.* 13*s.* 11*d.* ¼.

3. What will 650*l.* amount to in 5 Years at 5 *per Cent. per Annum* Compound Interest ? *Anf.* 829*l.* 11*s.* 8*d.*

4. What is the Amount of 550*l.* 10*s.* for 3 Years 6 Months, at 6 *per Cent. per Annum* Compound Interest ? *Anf.* 675*l.* 6*s.* 5*d.*

5. What is the Compound Interest of 764 *l.* for 4 Years and 9 Months, at 6*l. per Cent. per Annum* ?
Anf. 243*l.* 1.8*s.* 8*d.*

6. What is the Compound Interest of 57*l.* 10*s.* 6*d.* for 5 Years 7 Months 15 Days at 5 *per Cent. per Annum* ?
Answer, 18*l.* 3*s.* 8*d.* ½.

7. What is the Compound Interest of 259*l.* 10*s.* for 3 Years 9 Months and 10 Days, at 4 ½ *per Cent. per Annum*? *Anf.* 46*l.* 19*s.* 10*d.* ½.

REBATE or DISCOUNT

IS the abating of so much Money on a *Debt,* to be received before it is due, as that Money, if put to *Interest,* would gain in the same *Time,* and at the same *Rate.* As 100*l.* present Money would discharge a Debt of 105*l.* to be paid a Year to come, *Rebate* being made at 5 *per Cent.*

RULE. As 100*l.* with the *Interest* for the *Time* given : is to that *Interest* :: so is the Sum given : to the *Rebate* required.

Subtract the *Rebate* from the given Sum, and the Remainder will be the *present Worth.*

EXAMPLES.

1. What is the Discount of 487*l.* 12*s.* for 6 Months at 6 *per Cent. per Annum* ?

$$6 m. \tfrac{1}{2} \quad 6$$
$$\frac{}{3}$$
$$100$$

$$\overline{}$$

$$103 : 3 :: 487 \ 12$$
$$20 \qquad\qquad 20$$

$$\overline{}$$

$$2060 \qquad\qquad 9752$$
$$3$$

$$\overline{}$$

$$206|0)2925|6(14$$
$$206$$

$$\overline{}$$

$$865$$
$$824$$

Anfw. 14*l.* 4*s.*
$$\overline{}$$
$$416$$
$$20$$

$$\overline{}$$
$$)8320(4$$
$$824$$

$$\overline{}$$
$$8$$

2. What is the prefent Payment of 357*l.* 10*s.* which was agreed to be paid 9 Months hence, at 5 *per Cent. per Annum.*

$$6\tfrac{1}{2} \quad 5 \qquad 103 \ 15 : 3 \ 15 :: 357 \ 10$$
$$\qquad\qquad 20 \qquad 20 \qquad\quad 20$$
$$3\tfrac{1}{2} \quad 2 \ 10 \quad \overline{}$$
$$\qquad 1 \ \ 5 \ \ 2075 \qquad 75 \qquad 7|50$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\qquad 75$$
$$\qquad 3 \ 15 \qquad\qquad\qquad \overline{}$$
$$\qquad\qquad\qquad\qquad\qquad\qquad 35750$$
$$\qquad\qquad\qquad\qquad\qquad\qquad 50050$$
$$\qquad\qquad\qquad\qquad\qquad\qquad \overline{} \ \ 2|0)$$
$$\qquad 357 \ 10 \qquad 2075) 536250(25|8$$
$$\qquad 12 \ 18 \ 5 \qquad\qquad 4150 \qquad \overline{}$$
$$\qquad \overline{} \qquad\qquad \overline{} \ \ 12 \ 18 \ 5$$
$$\textit{Anf.} \ \ 344 \ 11 \ 7 \qquad 12125$$
$$\qquad\qquad\qquad\qquad 10375$$
$$\qquad\qquad\qquad\qquad \overline{}$$
$$\qquad\qquad\qquad\qquad 17500$$
$$\qquad\qquad\qquad\qquad 16600$$
$$\qquad\qquad\qquad\qquad \overline{}$$
$$\qquad\qquad\qquad\qquad ..900 \ \text{Rem.}$$

3. 'What

3. What is the Discount of 275*l.* 10*s.* for 7 Months, at 5 *per Cent. per Annum?* Answer, 7*l.* 16*s.* 1*d.*½.

4. Bought Goods to the Value of 109*l.* 10*s.* to be paid at 9 Months, what present Money will discharge the same, if I am allowed 6 *per Cent. per Annum* Discount.

Answer, 104*l.* 15*s.* 8*d.*½.

What is the present Worth of 527*l.* 9*s.* 1*d.* payable 7 Months hence, at 4¼ *per Cent. Answ.* 514*l.* 13*s.* 10*d.*¾.

6. What is the Discount of 85*l.* 10*s.* due *September* the 8th, this being *July* 4th, Rebate, at 5 *per Cent. per Annum?*

Answer 15*s.* 3*d.*½.

7. Sold Goods for 875*l.* 5*s.* 6*d.* to be paid 5 Months hence, what is the present Worth at 4½ *per Cent. Answ.* 859*l.* 3*s.* 4*d.*

8. What is the present Worth of 500*l.* payable in 10 Months, at 5 *per Cent. per Annum? Answer,* 480*l.*

9. How much ready Money can I receive for a Note of 75*l.* due 15 Months hence, at 5 *per Cent.?*

Answer, 70*l.* 11*s.* 9*d.*¼.

10. What will be the present Worth of 150*l.* payable at 3 four Months, *i. e.* one third at 4 Months, one third at eight Months, and one third at 12 Months, at 5 *per Cent.* Discount? 145*l.* 3*s.* 9*d.*¼.

11. Sold Goods to the Value of 575*l.* 10*s.* to be paid at two 3 Months, what must be discounted for present Payment, at 5 *per Cent.? Answer,* 564*l.* 18*s.* 7*d.*¼.

12. What is the present Worth of 500*l.* at 4 *per Cent.* 100*l.* being to be paid down, and the rest at two 6 Months? *Answer,* 488*l.* 7*s.* 9*d.*

EQUATION of PAYMENTS

IS when several *Sums* are due at different *Times.* To find a *mean Time* for paying the whole *Debt,* to do which this is the *common*

RULE. Multiply each *Term* by its *Time,* and divide the *Sum* of the *Products* by the whole *Debt* ; the Quotient is accounted the mean *Time.*

EXAMPLES.

1. *A* owes *B* 200*l.* whereof 40*l.* is to be paid at 3 Months, 60*l.* at 5 Months, and 100*l.* at 10 Months, at what Time may the whole Debt be paid together, without Prejudice to either?

$$
\begin{array}{rl}
l. & m \\
40 \times & 3 = 120 \\
60 \times & 5 = 300 \\
100 \times & 10 = 1000 \\
\hline
\end{array}
$$

$$2|00)14|20$$

7 Months $\frac{1}{10}$.

2. B owes C 800l. whereof 200l. is to be paid at 3 Months, 100l. at 4 Months, 300 at 5 Months, and 200l. at 6 Months; but they agreeing to make but one Payment of the whole, I demand when that Time muſt be?
Anſw. 4 Months $\frac{5}{8}$.

3. I bought of K a Quantity of Goods to the Value of 360l. which was to have been paid as follows: 120l. at 2 Months, 200 at 4 Months, and the reſt at 5 Months; but they afterwards agreed to have it paid at one mean Time, that Time is demanded? *Anſwer,* 3 Months $\frac{4}{9}$.

4. P owes Q a certain Sum of Money, which is to be paid, one Half preſent, one 4th at 4 Months, and the reſt at 8 Months, what would be the equated Time for the whole? *Anſwer,* 6 Months.

5. H is indebted to L a certain Sum, which is to be paid at 6 different Payments, that is, 1 4th at 2 Months, 1 8th at 3 Months, 1 8th at 4 Months, 1 4th at 5 Months, 1 8th at 6 Months, and the reſt at 7 Months; but they agree that the whole ſhould be paid at one equated Time, what is that Time? *Anſwer,* 4 Months one Quarter.

6. B ſold to C a Quantity of Goods upon Truſt, for which C was to pay $\frac{1}{3}$ of the Debt every 3 Months till the whole was diſcharged, but they afterwards agreed to make only one Payment of the whole, the Time is demanded?
Anſwer, 6 Months.

B A R T E R

IS the exchanging one Commodity for another, and informs the *Traders*, ſo to proportion their Goods, that neither may ſuſtain *Loſs*.

RULE. *Firſt* find the Value of that *Commodity,* whoſe *Quantity* is *given* ; then find what Quantity of the other, at the *Rate* propoſed, you may have for the ſame Money.

2dly.

2dly. When one has Goods at a certain Price *ready Money*, but in *Bartering* advances it to something more ; find what the other ought to *rate* his *Goods* at, in Proportion to that Advance, and then proceed as before.

EXAMPLES.

1. What Quantity of Chocolate, at 4*s. per lb.* must be delivered in Barter for 2 *cwt.* of Tea, at 9*s. per lb.*

$$2 \ cwt.$$
$$112$$
$$\overline{}$$
$$224$$
$$9$$
$$\overline{}$$
4)2016 *the Value of Tea.*

50¼ *Pounds of Chocolate.*

2. *A* and *B* barter : *A* hath 20 *cwt.* of Prunes, at 4*d. per lb.* ready Money, but in Barter will have 5*d. per lb.* and and *B* hath Hops worth 32*s. per cwt.* ready Money, what ought *B* to rate his Hops at in Barter, and what Quantity must be give for the 20 *cwt.* of Prunes?

112   4 : 5 : : 32
20   5
s.   ────────   ────────
40   2240   4)160
12   5   ────────
────────── *cw. qr. lb.*   40 *S.*
48|0)1120|0(23 1 9$\frac{16}{48}$
96

160
144   40*s.* in Barter.
────
16
4
────
64(1
48
────
16
28
────
448(9
432
────
16 Rem.

3. How

3. How much Tea at 9s. *per lb.* can I have in Barter for 4 *cwt.* 2 *qrs.* of Chocolate, at 4s. *per lb. Anfwer,* 2 *cwt.*

4. Two Merchants barter ; *A* hath 20 *cwt.* of Cheefe at 21s. 6d. *per cwt. B* hath 8 Pieces of *Irifh* Cloth, at 3l. 14s. *per Piece,* I defire to know who muft receive the Difference, and how much ? *Anfwer,* **B** *muft receive of* A 8l. 2s.

5. *A* and *B* barter : *A* hath 3½ *lb.* of Pepper, at 13d. ½ *per lb. B* hath Ginger at 15d. ¼. *per lb.* how much Ginger muft be delivered in Barter for the Pepper ? *Anfw.* 3lb. 1 oz. $\frac{35}{61}$.

6. How many Dozen of Candles, at 5s. 2d. *per Dozen,* muft be delivered in Barter for 3 *cwt.* 2 *qrs.* 16 *lb.* of Tallow, at 37s. 4d. *per cwt. ? Anfwer,* 26 *doz.* 3 *lb.*

7. *A* hath 608 Yards of Cloth worth 14s. *per Yard,* for which *B* giveth him 125l. 12s. in ready Money, and 85 *cwt.* 2 *qrs.* 24 *lb.* Bees-Wax, the Queftion is, what did *B.* reckon his Bees-Wax at *per cwt. ? Anfwer,* 3l. 10s.

8. *A* and *B* barter : *A* hath 320 *Dozen* of Candles, at 4s. 6d. *per Dozen,* for which *B* giveth him 30l. in Money, and the reft in Cotton, at 8d. *per lb.* I defire to know how much Cotton *B* gave *A* befides the Money ?

Anfwer, 11. *cwt.* 1. *qr.*

9. If *B* hath Cotton at 1s. 2d. *per lb.* how much muft he give *A* for 114 *lb.* of Tobacco, at 6d. *per lb.*

Anfw. 48 *lb.* $\frac{12}{14}$.

10. *C* hath Nutmegs worth 7s. 6d. *per lb.* ready Money but in barter will have 8s. *per lb.* and *D* hath Leaf Tobacco worth 9d. *per lb.* ready Money, how much muft *D* rate his Tobacco at *per lb.* that his **Profit** may be equivalent with *C*'s ?

Anfwer, 9d $\frac{1}{2}\frac{36}{90}$.

PROFIT and LOSS

IS a Rule that difcovers what is *got or loft* in the buying or felling of *Goods,* and inftructs us to raife or fall the Price, fo as to gain or lofe fo much *per Cent.* or otherwife.

EXAMPLES.

1. If a Yard of Cloth is bought for 11s. and fold for 12s. 6d. what is the Gain *per Cent ?*

s.	d.
12	6
11	0
1	6

```
        s.   s. d.    l.
As 11 : 1  6 :: 100
        12         20
        ──        ──
        18        2000
                    18
                  ──────
              11)36000
                  ──────
              12)3272
                  ──────
              2|0)27|2 8
                  ──────
                  13  12  8,³₁₁
```

2. If 60 Ells of Holland cost 18*l.* what must 1 Ell be sold for to gain 8*l. per Cent?*

```
As 100 : 18 :: 108      12 × 5 = 60
              18           12)19  8  9½
            ────          ──────────────
   1|00)19|44              5)1 12  4¾
              20          ──────────────
            ────            6  5¼  Answ.
            8|80
              12
            ────
            9|60
              4
            ────
            2|40
```

3. If 1 *lb.* of Tobacco cost 16*d.* and is sold for 20*d.* what is the Gain *per Cent? Answer,* 25*l.*

4. If a Parcel of Cloth be sold for 560*l.* and at 12 *per cent.* Gain, what was the prime Cost? *Answer,* 500*l.*

5. If a Yard of Cloth is bought for 13*s.* 4*d.* and sold again for 16*s.* what is the Gain *per Cent. Answer,* 20*l.*

6. If 112 *lb.* of Iron cost 27*s.* 6*d.* what must 1 *cwt.* be sold for, to gain 15 *per Cent.? Answer,* 1*l.* 11*s.* 7*d.* ½.

7. If 375 Yards of Broad Cloth be sold for 490*l.* and 20 *per Cent.* Profit, what did it cost *per* Yard? *Answ.* 1*l.* 1*s.* 9¼.

8. Sold 1 *cwt.* of Hops for 6*l.* 15*s.* at the Rate of 25*l. per Cent.* Profit, what would have been the Gain *per Cent.* if I had sold them for 8*l. per cwt. Answer.* 48*l.* 2*s.* 11*d.* ½.

9.

9. If 90 Ells of Cambric coſt 60*l.* how muſt I ſell it *per* Yard to gain 18*l. per Cent.? Anſwer,* 12*s.* 7*d.*

10. A Plumber ſold 10 Fother of Lead for 204*l.* 15*s.* (the Fother being 19 *cwt.* ½) and gain'd after the Rate of 12*l.* 10*s. per Cent.* what did it coſt him *per cwt.? Anſw.* 18*s.* 8*d.*

11. Bought 436 Yards of Cloth, at the Rate of 8*s.* 6*d. per* Yard, and ſold it for 10*s.* 4*d. per* Yard, what was the Gain of the whole? *Anſw.* 39*l.* 19*s.* 4*d.*

12. If I buy Shoes at 4*s. per* Pair, and ſell them again for 4*s.* 9*d. per* Pair, what may I gain by laying out 100*l.? Anſw.* 18*l.* 5*s.*

13. Bought 100 Yards of broad Cloth for 56*l.* how much muſt it be ſold for *per* Yard, to gain 19*l.* in the whole? *Anſw.* 15*s. per* Yard.

FELLOWSHIP

IS when two or more join their *Stocks* and Trade toge-gether, ſo to determine each Perſon's particular *Share* of the *Gain* or *Loſs*, in Proportion to his *Principal* in the joint *Stock.*

By this Rule a Bankrupt's Eſtate may be divided amongſt his Creditors, as alſo Legacies may be adjuſted when there is a Deficiency of Aſſets or Effects.

FELLOWSHIP *is either with or without* TIME.

FELLOWSHIP *without* TIME.

RULE. As the whole *Stock* : is to the whole *Gain* and Loſs : : ſo is each *Man's Share* in *Stock* : to his *Share* of the *Gain* or *Loſs.*

PROOF. Add all the *Shares* together, and the *Sum* will be equal to the given *Gain* or *Loſs* ;—but the ſureſt Way is, As the whole *Gain* or *Loſs* : is to the whole *Stock* : : ſo is each *Man's Share* of the *Gain* or *Loſs* : to his *Share* in *Stock.*

EXAMPLES.

1. Two Merchants trade together ; *A* put into Stock 20*l.* and *B.* 40*l.* they gained 50*l.* what is each Perſon's Share thereof ?

$$20 + 40 = 60.$$

As 60 : 50 :: 20   As 60 : 50 :: 40   33   6 8 B's *Share*
    20 ·   40   16 13 4 A's

6|0)100|0(60)2000   50
  16*l*. 13*s*. 4*d*.   33*l*. 6*s*. 8*d*.

2. Three Merchants trade together, *A*, *B*, and *C*; *A* put in 20*l*. *B* 30*l*. and *C*. 40*l*. they gained 180*l*. what is each Man's Part of the Gain ? *Anſ.* A 40*l*. B 60*l*. C 80*l*.

3. *A*, *B*, and *C* enter into Partnerſhip; *A* puts in 364*l*. *B* 482*l*. and *C* 500*l*. and they gained 867*l*. what is each Man's Share in Proportion to his Stock ?

Anſ. A 234*l*. 9*s*. 3*d*.¼. *rem*. 70. B 310*l*. 9*s*. 5*d*. —— *rem*. 248. C 322*l*. 1*s*. 3*d*. ½. *rem*. 1028.

4. Four Merchants, *A*, *B*, *C* and *D* make a Stock; *A* puts in 227 *l*. B 349*l*. C 115*l*. and D 439*l*. in trading they gained 428*l*. I demand each Merchant's Share of the Gain ?

Anſwer, A 85*l*. 19*s*. 6*d*. ¾ 690. B 132*l*. 3*s*. 9*d*. —120. C 43*l*. 11*s*. 1*d*. ¾. 250. D 166*l*. 5*s*. 6*d*. ¼. 70.

5. Three Perſons trading together, loſt Goods to the Value of 800*l*. *A*'s ſtock was 1200*l*. *B*'s 4800*l*. and *C*'s 2000*l*. I deſire to know what each Perſon loſt ?

Anſwer, A 120*l*. B. 480*l*. *and* C 200.

6. Three Perſons, *D*, *E*, and *F* join in Company; *D*'s Stock was 750*l*. *E*'s 460*l*. and *F*'s 500*l*. and at the End of 12 Months they gained 684 *l*. what is each Man's particular Share of the Gain ? *Anſwer*, D 300*l*. E 184, *and* F 200.

7. A Merchant is indebted to *A* 275*l*. 14*s*. to *B* 304*l*. 7*s*. to *C* 152*l*. and to *D* 104*l*. 6*s*. but upon his Deceaſe, his Eſtate is found to be worth but 675*l*. 15*s*. how muſt it be divided amongſt his Creditors ? *A* 222*l*. 15*s*. 2*d*.---6584. *B*'s 245*l*. 18*s*. 1*d*. ½. 15750. *C*s 122*l*. 16*s*. 2*d*. ¾. 12227. and *D*'s 84*l*. 5*s*. 5*d*.---15620.

8. A Perſon being indebted to *A* 742*l*. 12*s*. to *B* 641*l*. 19*s*. 8*d*. and to *C* 987*l*.19*s*. 9*d*. has a Statute of Bankruptcy iſſued out againſt him; and upon examining his Effects, they amounted but to 1400*l*. 14*s*. 6*d*. I deſire to know what each Perſon will receive for his Debt, *Anſ.* A 438*l* 8*s*. 4*d*.¼. 303527. B 379*l*. 0*s*. 3*d*. ¾ 158361. C 583*l*. 5*s*. 9*d*. ¾. 107529.

9. Four Perſons trading together in a Joint Stock, of which *A* has ⅓. *B* ¼. *C* ⅕. and *D* ⅙, and at the End of Six Months, they gain 100*l*. what is each Perſon's Shar

of the ſaid Gain ? *Anſ.* A 35*l*. 1*s*. 9*d*.--48. B 26*l*. 6*s*. 3*d*.--36.
C 21*l*. 1*s*. 0*d*. $\frac{1}{2}$.120, and D 17*l*. 10*s*. 10*d*. $\frac{1}{2}$ 24.

10. Two Perſons purchaſed an Eſtate of 1700*l*. *per Annum*
Freehold for 27200*l*. when Money was at 6 *per Cent*. In-
tereſt, and 4*s*. *per l*. Land-Tax, whereof *A* paid 15000*l*.
and *B* the reſt ; ſome time after the Intereſt of Money falling
to 5 *per Cent*. and 2*s*. *per l*. land-Tax, they ſell the ſaid
Eſtate for 24 Years Purchaſe, I deſire to know each Perſon's
Share ? *Anſwer*, A 22500*l*. B 18300*l*.

11. Four Men trade with a Stock of 800*l*. and they gained
in two Years Time twice as much, and 40*l*. over ; *A*'s Stock
was 140*l*. *B*'s 260*l*. and *C*'s 300*l*. I demand *D*'s Stock, and
what each Man gained by trading ? *Anſ. D's Stock* 100*l*.
A gained 287*l*. B 533*l*. C 615*l* and D 205*l*.

FELLOWSHIP *with* TIME.

RULE. As the *Sum* of the *Products* of each Man's *Mo-*
ney and *Time* : is to the whole *Gain* or *Loſs* :: ſo is each
Man's Product : to his *Share* of the *Gain* or *Loſs*.

PROOF. As in *Fellowſhip* without *Time*.

EXAMPLES.

1. *A* and *B* enter Partnerſhip ; *A* put in 40*l*. for three
Months, and *B* 75*l*. for 4 Months, and they gained 70*l*.
what is each Man's Share of the Gain ?

$$40 \times 3 = 120 \qquad As\ 420 : 70 :: 120 \qquad As\ 420 : 70 :: 300$$
$$75 \times 4 = 300 \qquad\qquad 120 \qquad\qquad\qquad\qquad 300$$
$$\overline{} \qquad\qquad \overline{} \qquad\qquad\qquad \overline{}$$
$$420 \qquad\qquad 42|0)84|0|0 \qquad\qquad 42|0)2100|0$$
$$\qquad\qquad\qquad \overline{} \qquad\qquad\qquad \overline{}$$
$$\qquad\qquad\qquad 20 \qquad\qquad\qquad\qquad 50$$

2. Three Merchants join in Company, *A* puts in 195*l*. 14*s*
for three Months, *B* 169*l*. 18*s*. 3*d*. for five Months, and
C 59*l*. 14*s*. 10*d*. for 11 Months, and they gained 364*l*. 18*s*.
what is each Man's Part of the Gain? *Anſ. A's* 102*l*. 6*s*. 4*d*.—
5008. B's 148*l*. 1*s*. 1*d*. $\frac{1}{2}$. 482802. and C's 114*l*. 10*s*. 6*d*. $\frac{1}{4}$.
14707.

3.

3. Three Merchants join in Company for 18 Months ; *A* puts in 500*l.* and at 5 Months End took out 200*l.* at 10 Months End puts in 300*l.* and at the End of 14 Months takes out 130*l. B* puts in 400*l.* and at the End of 3 Months 270*l.* more, at 9 Months he takes out 140*l.* but puts in 100*l.* at the End of 12 Month's, and withdraws 99*l* at the End of 15 Months ; *C* puts in 900*l.* and at 6 Months took out 200*l.* at the End of 11 Months puts in 500*l.* but takes out that and 100 more at the End of 13 Months ; they gained 200*l.* I defire to know each Man's Share of the Gain ?

Anfwer, A 50*l.* 7*s.* 6*d.* — 21720. B 62*l.* 12*s.* 5*d.* ¼. — 29859, *and* C 87*l.* 0*s.* 0*d.* ¼. 14167.

4. *A B* and *C* hold a Piece of Ground in common, for which they are to pay 36*l.* 10*s.* 6*d. A* puts in 23 Oxen 27 Days, *B* 21 Oxen 35 Days, and *C* 16 Oxen 23 Days, what is each Man to pay of the faid **Rent** ?

Anfwer, A 13*l.* 3*s.* 1*d.* ½. 624. B 15*l.* 11*s.* 5*d.*—1688, *and* C 7*l.* 15*s.* 11*d.*—1136.

ALLIGATION.

ALLIGATION is either MEDIAL or ALTERNATE.

ALLIGATION MEDIAL

IS when the *Prices* and *Quantities* of feveral *Simples* are given to be mixed, to find the *mean Price* of that Mixture.

RULE. As the whole *Compofition* : is to its total *Value* : : fo is any Part of the *Compofition* : to its *mean Price.*

PROOF. Find the Value of the whole Mixture at the *mean Rate,* and if it agrees with the *total Value* of the feveral *Quantities* at their refpective *Prices,* the Work is right.

EXAMPLES.

1. A **Farmer** would mix 6 Bufhels of Wheat at 6*s. per* Bufhel, 8 **Bufhels** of Rye at 4*s. per* Bufhel, and 12 Bufhels of Barley at 3*s. per* Bufhel, what is the Price of a Bufhel of this Mixture ?

B.	*s.*		*s.*	*B.*	*s.*	*B.*	*s.*
6 at	6 per *Bu.*=36			As 26 : 104 : :		1 :	4
8 at	4 per *Bu.*=32						
12 at	3 per *Bu.*=36						

26   104

2. A Vintner mingles 15 Gallons of Canary, at 8s. *per* Gallon, with 20 Gallons at 7s. 4d. *per* Gallon, 10 Gallons of Sherry, at 6s. 8d. *per* Gallon, and 24 Gallons of White Wine, at 4s. *per* Gallon, what is the Worth of a Gallon of this Mixture? *Answ.* 6s. 2d. $\frac{1}{2}\frac{46}{69}$.

3. A Grocer mingled 4 *cwt.* of Sugar, at 56s. *per cwt.* 7 *cwt.* at 43s. *per cwt.* and 5 *cwt.* at 37s. *per cwt.* I demand the Price of 2 *cwt.* of this Mixture? *Answ.* 4l. 14s. 8d.

4. A Maltster mingles 30 Quarters of brown Malt, at 28s. *per* Quarter, with 46 Quarters of pale, at 30s. a Quarter, and 24 Quarters of high dried *ditto*, at 25s. a Quarter, what is the Value of 8 Bushels of this Mixture?
  Answ. 11*l.* 5s. $\frac{3}{5}$.

5. If I mix 27 Bushels of Wheat, at 5s. 6d. the Bushel, with the same Quantity of Rye, at 4s. *per* Bushel, and 14 Bushels of Barley, at 2s. 8d. *per* Bushel, what is the Worth of a Bushel of this Mixture? *Answ.* 4s. 3d. $\frac{3}{4}\frac{23}{68}$.

7. A Grocer mingled 3 *cwt.* of Sugar, at 56s. *per cwt.* 6 *cwt.* at 1l. 17s. 4d. *per cwt.* and 3 *cwt.* at 3l. 14s. 8d. *per cwt.* what is 1 *cwt.* of this Mixture worth? *Answ.* 2l. 11s. 4d.

7. A Mealman has Flower of several Sorts, and would mix 3 Bushels at 3s. 5d. *per* Bushel, 4 Bushels at 5s. 6d *per* Bushel, and 5 Bushels at 4s. 8d. *per* Bushel, what is the Worth of a Bushel of this Mixture? *Answ.* 4s. 7d $\frac{1}{2}$, $\frac{4}{12}$.

8. A Vintner mixes 20 Gallons of Port, at 5s. 4d. *per* Gallon, with 12 Gallons of White Wine, at 5s. *per* Gallon, 30 Gallons of *Lisbon*, at 6s. *per* Gallon, and 20 Gallons of Mountain, at 4s. 6d. *per* Gallon, what is a Gallon of this Mixture worth? *Answ.* 5s. 3d. $\frac{3}{4}\frac{50}{82}$.

9. A Farmer mingled 20 Bushels of Wheat, at 5s. *per* Bushel, and 36 Bushels of Rye, at 3s. *per* Bushel, with 40 Bushels of Barley, at 2s. *per* Bushel, I desire to know the Worth of a Bushel of this Mixture? *Answ.* 3s.

10. An Alehouse-keeper mixed 3 Sorts of Ale together, *viz.* 21 Gallons at 9d. *per* Gallon, 16 Gallons at 7d. *per* Gal-

Gallon, and 12 Gallons at 6*d. per* Gallon, what is a Gallon of this Mixture worth? *Anſw.* 7*d.* $\frac{1}{2} \cdot \frac{22}{45}$.

11. An Hoſtler mixing Provender for his Horſes, would put in a Quantity of Oats, at 3*s.* 6*d.* the Buſhel, with the like Quantity of Beans, at 5*s. per* Buſhel, what is the Price of a Buſhel of this Mixture? *Anſwer,* 4*s* 3*d.*

12. A Refiner having 5 *lb.* of Silver Bullion of 8 Ounces fine, 10 *lb.* of 7 Ounces fine, and 15 *lb.* of 6 Ounces fine, would melt all together, I demand the Fineneſs of 1 *lb.* of this Mixture? *Anſwer,* 6 *oz.* 13 *dwt.* 8 *gr.*

ALLIGATION Alternate

Is when the *Prices* of ſeveral Things are given, to find ſuch *Quantities* of them to make a *Mixture,* that may bear a *Price* propounded.

In ordering the Rates and given Prices, obſerve,

1. Place them one under the other, and the propounded *Price* or *mean Rate,* on the left Hand of them, *thus*

$$22\quad \begin{array}{c} 18 \\ 20 \\ 24 \\ 28 \end{array} \quad \begin{array}{c} 2 \\ 6 \\ 4 \\ 2 \end{array}$$

2. *Link* the ſeveral *Rates* together by 2 and 2, always ob-ſerving to join a *greater* and a *leſs* than the *mean.*

3. Againſt each *Extream* Place the *Difference* of the *Mean* and its *Yoke-fellow.*

When the Prices of the ſeveral Simples and the mean Rate are given, without any Quantity, to find how much of each Simple is required to compoſe the Mixture.

RULE. Take the *Differences* between each *Price* and the *mean Rate,* and ſet them *alternately,* they will be the *Anſwer* required.

PROOF. By Alligation Medial.

E X A M P L E S.

1. A Vintner would mix four Sorts of Wines together of 18*d.* 20*d.* 24*d.* and 28*d. per* Quart, what Quantity of each muſt he take to ſell the Mixture at 22 *d. per* Quart.

$$
\begin{array}{r}
& Anf. & Proof. \\
18 \;\rceil & 2 \text{ of } 18d. = 36d. \\
22\ 20\ \rule{0pt}{1em} & 6 \text{ of } 20d. = 120 \\
24\ \rule{0pt}{1em} & 4 \text{ of } 24d. = 96 \\
28\ \rule{0pt}{1em} & 2 \text{ of } 28d. = 56 \\
\hline
14 &)308 \\
& 22d.
\end{array}
$$

Or thus :

$$
\begin{array}{r}
& Anf. & Proof. \\
18\;\rceil & 6 \text{ qr. of } 18d. = 108d. \\
22\ 20\;\rceil & 2 \quad\text{ of } 20 = 40 \\
24\;\rfloor & 2 \quad\text{ of } 24 = 48 \\
28\ \rule{0pt}{1em} & 4 \quad\text{ of } 28 = 112 \\
\hline
14 &)308 \\
\end{array}
$$

22d. *as before*.

Note. Queſtions in this Rule do admit of a great Variety of Anſwers, according to the Manner of linking them.

2. A Grocer would mix Sugars at 4d. 6d. and 10d. per lb. ſo as to ſell the Compound at 8d. per lb. what Quantity of each muſt he take ? *Anſw*. 2 lb. at 4d. 2 lb. at 6d. and 6lb. at 10d.

3. I deſire to know how much Tea, at 16s. 14s. 9s. and 8s. per lb. will compoſe a Mixture worth 10s. per lb. ? *Anſw*. 1 lb. at 16s. 2 lb. at 14s. 6lb. at 9s. and 4 lb. at 8s.

4. A Farmer would mix as much Barley at 3s. 6d. per Buſhel, Rye at 4s. per Buſhel, and Oats at 2s. per Buſhel, as to make a Mixture worth 2s. 6d. per Buſhel; how much is that of each Sort? *Anſwer*, 6 of *Barley*, 6 of *Rye, and* 30 of *Oats*.

5. A Grocer would mix Raiſins of the Sun at 7d. per lb. with Malaga at 6d. and Smyrna's at 4d. per lb. I deſire to know what Quantity of each Sort he muſt take to ſell them at 5d. per lb. ? *Anſwer*, 1 lb. of *Raiſins of the Sun*, 1 lb. of *Maleg*a, and 3 lb. of *Smyrna's*.

6. A Tobacconiſt would mix Tobacco of 2s. 1s. 6d. and 1s. 3d. per lb. ſo as the Compound may bear a Price of 1s. 8d. per lb. what Quantity of each Sort muſt take ? *Anſw*. 7 lb. at 2s. 4 lb. at 1s. 6d. and 4 lb. at 1s. 3d.

A L-

ALTERNATION PARTIAL

IS when the *Prices* of all the *Simples*, the *Quantity* of but one of them, and the *mean Rate* are given, to find the several *Quantities* of the rest in Proportion to that given.

RULE. 1. Take the *Difference* between each *Price*, and the *mean Rate* as before. *Then*

As the *Difference* of that *Simple*, whose *Quantity* is given : is to the rest of the *Differences severally* : : so is the *Quantity* given : to the several *Quantities* required.

EXAMPLES.

1. A Tobacconist being determined to mix 20 *lb.* of Tobacco, at 15*d. per lb.* with others at 16*d. per lb.* 18*d. per lb.* and 22*d. per lb.* how many Pounds of each Sort must he take to make one Pound of that Mixture worth 17 *d.*

		Answ.		*Proof.*	
	15 ⌐ 5	20 *lb.* at 15*d.*=300*d.*	As 5 : 1 : : 20 : 4
17	16 ⌐ 1	4 *lb.* at 16*d.*= 64	As 5 : 1 : : 20 : 4
	18 ⌐ 1	4 *lb.* at 18*d.*= 72	As 5 : 2 : : 20 : 8
	22 ⌐ 2	8 *lb.* at 22*d.*=176

As 36 *lb.* :   612*d.* : :   1*lb.* : 17*d.*
                        36
                      ―――
                      252
                      252

2. A Farmer would mix 20 Bushels of Wheat, at 60*d.* the Bushel, with Rye, at 36*d.* Barley, at 24 *d.* and Oats at 18*d. per* Bushel ; how much must he take of each Sort to make the Composition worth 32*d. per* Bushel ? *Answ.* 20 *Bushels of Wheat.* 35 *Bushels of Rye,* 70 *Bushels of Barley, and* 10 *Bushels of Oats.*

3. A Person is desirous of mixing Wheat at 4*s. per* Bushel, Rye at 3*s. per* Bushel, Barley at 2*s.* 6*d. per* Bushel, with 12 Bushels of Oats, at 18 *d. per* Bushel, would be glad to know how many Bushels of each Sort he must take to make the Composition worth 3*s.* 6*d. per* Bushel, *Answ.* 96 *Bushels of Wheat,* 12 *Bushels of Rye,* 12 *of Barley, and* 12 *of Oats.*

H 3   4. A

4. A Diftiller would mix 40 Gallons of *French* Brandy, at 12s. *per* Gallon, with *English* at 7s. and Spirits at 4s. *per* Gallon, what Quantity of each Sort muft he take to afford it for 8s. *per* Gallon? *Anfwer*, 40 *Gall. French*, 32 *English*, *and* 32 *Spirits*.

5. A Man being determined to mix 10 Bufhels of Wheat, at 4s *per* Bufhel, with Rye, at 3s. *per* Bufhel, Barley, at 2s. and Oats at 1s. *per* Bufhel, what Quantity of each muft he take that it may bear a Price of 28d. *per* Bufhel? *Anfwer*, 10 *Bufhels of Wheat*, 40 *Bufhels of Rye*, 50 *Bufhels of Barley*, *and* 20 *Bufhels of Oats*.

6. A Wine Merchant is defirous of mixing 18 Gallons of Canary, at 6s. 9d. *per* Gallon, with Malaga's at 7s. 6d. *per* Gallon, Sherry, at 5s. *per* Gallon, and White Wine at 4s. 3d. *per* Gallon, how much of each Sort muft he take, that the Mixture may be fold for 6s. the Gallon? *Anfw.* 18 *Gallons of Canary*, 31 $\frac{1}{2}$ *of Malaga*, 13 $\frac{1}{2}$ *of Sherry, and* 27 *of White Wine.*

ALTERNATION TOTAL

Is when the *Price* of each *Simple*, the *Quantity* to be compounded, and the *mean Rate* are given, to find how much of *each* Sort will make that *Quantity*.

RULE. 1. Take the *Difference* between each *Price* and the *mean Rate* as before, then

As the *Sum* of the *Differences* : is to *each* particular *Difference* : : fo is the *Quantity* given : to the *Quantity* required.

EXAMPLES.

1. A Grocer has four Sorts of Sugar, *viz.* of 12d. 10d. 6d and 4d. *per lb*, and would make a Compofition of 144 *lb*. worth 8d. *per lb*. I defire to know, what Quantity of each he muft take?

	Anf.	Proof.	
12	4 - - 48 at 12d.	576	As 12 : 4 : : 144 : 48
8 10	2 - - 24 at 10d.	240	As 12 : 2 : : 144 : 24
6	2 - - 24 at 6d.	144	
4	4 - - 48 at 4d.	192	
12 144		)1152(8d.	

2. A Druggist having four Sorts of Tea, of 5s. 6s. 8s. and 9s. *per lb.* would have a Composition of 87 lb. worth, 7s. *per lb.* what Quantity must there be of each?

Anf. 14½ lb. of 5s. 28 lb. of 6s. 28 lb. of 8s. and 14½ lb. of 9s.

3. A Vintner hath four Sorts of Wine, *viz.* White-Wine, at 4s. *per Gallon, Flemish* at 6s. *per Gallon, Malaga* at 8s. *per* Gallon, and Canary at 10s. *per* Gallon, would make a a Mixture of 60 Gallons to be worth 5s. *per* Gallon, what Quantity of each must he take? *Anf.* 45 *Gallons of White-Wine,* 5 *Gallons of* Flemish, 5 *Gallons* Malaga, *and* 5 *Gallons* Canary.

4. A Grocer having four Sorts of Currants of 11d. 9d. 6d. and 4d. the *lb.* is desirous of making a Composition of 240 lb. worth 8d. the *lb.* how much of each must he take?

Anf. 96. *lb. at* 11d. 48 *lb. at* 9d. 24 *lb. at* 6d. *and* 72 lb. *at* 4d.

5. A Goldsmith hath four Sorts of Gold, *viz.* of 24 Carats fine, of 22, 20 and 15 Carats fine, would mix as much of each Sort together, so as to have 42 oz. of 17 Carats fine, how much must he take of each? *Anf.* 4 *of* 24 *Carats fine,* 4 *of* 22, 4 *of* 20, *and* 30 *of* 15 *Carats fine?*

6. A Druggist having some Drugs of 8s. 5s. and 4s. *per lb.* made them into two Parcels, one of 28 lb. at 6s. *per lb.* the other of 42 lb. at 7s. *per lb.* how much of every Sort did he take for each Parcel?

Anf. 12 *lb. of* 8s.	*Anf.* 30 *lb. of* 8s.
8 *lb. of* 5s.	6 *lb. of* 5s.
8 *lb. of* 4s.	6 *lb. of* 4s.
28 *lb. at* 6s. *per lb.*	42 *lb. at* 7s. *per. lb.*

POSITION, *or the* RULE *of* FALSE

IS a Rule, that by *False* or *supposed* Numbers, taken at Pleasure, we discover the *true* ones required.

POSITION is divided into two Parts SINGLE and DOUBLE.

SINGLE POSITION

Is by using *one supposed* Number, and working with it as the *true* one, you find the *real* Number required by the following

RULE. As the Total *of the* Errors : *is to the* true Total : : *so is the* supposed Number : *to the* true one *required.*

PROOF.

Proof. Add the feveral Parts of the Sum together, and if it agrees with the Sum, it is right.

Examples.

1. A School-mafter being afked how many Scholars he had, faid, if I had as many, half as many, and one Quarter as many more, I fhould have 88, how many had he? *Anfwer,* 32.

Suppofe he had	40	As	110 : 88 :: 40	32
as many —	40		40	32
half as many	20			16
¼ as many	10	11|0)352|0(32	8
	110	33		88 *Proof.*
		22		
		22		

2. A Perfon having about him a certain Number of *Portugal* Pieces, faid if the third, fourth and fixth of them were added together, they would make 54. I defire to know how many he had? *Anfwer,* 72.

3. A Gentleman bought a Chaife, Horfe and Harnefs for 60*l.* the Horfe came to twice the Price of the Harnefs, and the Chaife to twice the Price of the Horfe and Harnefs, what did he give for each? *Anf. Horfe* 13*l.* 6*s.* 8*d. Harnefs,* 6*l.* 13*s.* 4*d. Chaife* 40*l.*

4. Two Men, *A and B,* having found a Purfe of Money, difputed who fhould have it; *B* faid the Half, Third and Fourth of the Money made 130*l.* and if *A* could tell how much was in it, he fhould have it all, otherwife nothing, how much was in the Purfe? *Anf.* 120*l.*

5. A Man overtaking a Maid driving a Flock of Geefe, faid to her, how do you do, Sweet Heart? where are you going with thefe 30 Geefe. No, Sir, faid fhe, I have not thirty, but if I had as many more, half as many more, and 5 Geefe befides, I fhould have thirty? how many had fhe? *Anf.* 10.

6. A Perfon delivered to another a Sum of Money unknown, to receive Intereft for the fame at 6 *per Cent. per Annum* fimple Intereft, and at the End of 10 Years received for Principal and Intereft 300*l.* what was the Sum lent? *Anfwer* 187*l.* 10*s.*

DOUBLE

DOUBLE POSITION.

Is by making Use of *two supposed* Nùmbers, and if both prove *false*, (as it generally happens) are with their *Errors* to be thus ordered.

RULE 1. Place each *Error* against its respective *Position*.

2. Multiply them crosswise.

3. If the *Errors* are *alike*, i.e. both *greater*, or both *less* than the given Number, take their Difference for a *Divisor*, and the *Difference* of their Products for a Dividend.

But if *unlike*, take their *Sum* for a *Divisor*, and the *Sum* of their *Products* for a *Dividend*, the *Quotient* will be the Answer.

EXAMPLES.

1. *A B* and *C* would divide 200*l.* between them, so as that *B* may have 6*l.* more than *A*, and *C* 8*l.* more than *B*, how much must each have?

Suppose A had 40		*then suppose A had* 50		
then B had 46		*then B must have* 56		
and C — 54		*and C* — — 64		

sup. Errors 140	*too little by* 60		170	*too little by* 30
40 - 60				
50 - 30	60		60 *A*	
	30		66 *B*	
3000 1200			74 *C*	
1200	30			
			200 *Proof*	

3|0)180|0

60 *Ans. for A.*

2. A Man hath two Silver Cups of unequal Weight, having one Cover to both, of 5 *oz.* now if the Cover is put on the lesser Cup, it will be double the Weight of the greater Cup, and if set on the greater Cup, it will be thrice as heavy as the lesser Cup, What is the Weight of each Cup? *Answer,* 3 *oz. lesser,* 4 *greater.*

3. *A B* and *C* playing at Hazard together, the Money staked was 196 Guineas, but disagreeing, each seized as many as he could, *A* got a certain Quantity, *B* as many as *A* and 16 more, and *C* the Sixth Part of both their Sums, how many had each? *Ans.* A 76, B 92, *and* C 28.

4. A

4. A Gentleman bought a House with a Garden and a Horse in the Stable for 500*l.* now he paid 4 Times the Price of the Horse for the Garden, and 5 Times the Price of the Garden for the House, what was the Value of the House, Garden and Horse separately? *Ans. Horse* 20*l. Garden* 80*l. House.* 400*l.*

5. Three Persons discoursed concerning their Ages; says *A* I am 30 Years of Age, says *B* I am as old as *A* and ¼ of *C,* and says *C* I am as old as you both; What was the Age of each Person? *Ans. A* 30, *B* 50, *and C* 80.

6. A Countryman drove his Swine to the Market, *viz.* Hogs, Sows, and Pigs, sold them for 38*l.* and for every Hog he had 18*s.* every Sow 16*s.* and for every Pig 2*s.* there were as many Hogs as Sows, and for every Sow 3 Pigs; how many were there of each Sort? *Ans.* 19 *Hogs,* 19 *Sows,* 57 *Pigs.*

7. *A* stealing Apples, was taken by *B,* and to appease him, gives him half he had, and *B* gives him back 10, going further, he meets *C,* who took from him half of what he had left, and gives him back 4. After that meeting with *D* he gives him half of what he had, and he returns him back one, at last getting safe away, he finds he had 13 left, how many had he at first? *Ans.* 60.

8. A Gentleman coming into a Garden, meets with some Ladies, says to them, Good Morning to you 10 fair Maids! Sir you mistake (answered one of them) we are not 10, but if we were twice as many more as we are, we should be as many above 10 as we are now under, how many were they? *Ans.* 5.

EXCHANGE

IS the receiving of Money in one Country for the same Value paid in another.

The *Par* of Exchange is always fixed and certain, it being the intrinsic Value of foreign Money compared with *Sterling,* but the *Course* of Exchange rises and falls upon various Occasions.

I. FRANCE.

They keep their *Accounts* at *Paris, Lyons* and *Rouen* in *Livres, Sols,* and *Deniers,* and Exchange by the *Crown,* = 4*s.* 6*d.* at *Par.*

NOTE,

NOTE. 12 *Deniers make* 1 *Sol.*
      20 *Sols* - - - - 1 *Livre.*
      3 *Livres* - - 1 *Crown,*
        To change *French* into *Sterling.*

RULE. *As* 1 *Crown* : *is to the given Rate* : : *so is the* French *Sum* : *to the* Sterling *required,*
        To change *Sterling* into *French.*

RULE. *As the Rate of Exchange* : *is to* 1 *Crown* : : *so is the* Sterling *Sum* : *to the* French *required.*

EXAMPLES.

1. How many Crowns muſt be paid at *Paris*, to receive in *London* 180*l.* Exchange at 4*s.* 6*d. per* Crown?

2. A Merchant at *Paris* remits to his Correſpondent in *London* 800 Crowns, at 4*s.* 6*d.* each, what is the Value in *Sterling.*

$$\begin{array}{ccc} d. & cr. & l. \\ As \; 5\tfrac{1}{2} : & 1 \; :: & 180 : \end{array}$$

     240 *Crowns,*

    54)43200 (800
      43 ²

    ... 00

         cr.
    1 : 54 : : 800 :
          5½

     12)43200

     2|0)360|0

      180 *L.*

3. How much Sterling muſt be paid in *London* to receive in *Paris* 758 Crowns Exchange, at 56*d. per* Crown.
   Anſw. 176*l.* 17*s.* 4*d.*

4. A Merchant in *London* remits 176*l.* 17*s.* 4*d.* to his Correſpondent at *Paris*, what is the Value in *French* Crowns, at 56*d. per* Crown? *Anſwer,* 758.

5. Change 725 Crowns, 17 Sols, 8 Den. at 54*d.* ½ *per* Crown, into Sterling, what is the Sum?
   Anſwer. 164*l.* 14*s.* 0*d.* ½.

6. Change 164*l.* 14*s.* 0*d.* ½ Sterling, into *French* Crowns Exchange, at 54*d.* ½ *per* Crown? *Anſw.* 725 *Crowns,* 17 *Sols,* 7 *Deniers.*

II. SPAIN.

They keep their Accounts at *Madrid, Cadiz,* and *Seville,* in *Rials* and *Marvadies,* and Exchange by the *Piece of Eight* =4*s.* 6*d. at Par.*   NOTE.

NOTE. 372 *Marvadies make* 1 *Rial.*
        8 *Rials* —— 1 *Piece of Eight.*
RULE. *As with* France.

EXAMPLES.

1. A Merchant at *Cadiz* remits to *London* 2547 Pieces of Eight, at 56*d. per* Piece, how much Sterling is the Sum? *Answer*, 594*l*. 6*s.*

2. How many Pieces of Eight, at 56*d.* each will answer a Bill of 594*l*. 6*s.* Sterling? *Answer*, 2547.

3. If I pay a Bill here of 2500*l.* what *Spanish* Money may I draw my Bill for at *Madrid,* Exchange at 57*d.* ½ *per* Piece of Eight? *Answer*, 10434 *Pieces of Eight*, 6 *Rials,* 97 *Mar.* ⅓.

III. ITALY.

They keep their Accounts at *Genoa* and *Leghorn* in *Livres, Sols,* and *Deniers,* and Exchange by the *Piece of Eight,* or *Dollar*=4*s.* 6*d.* at Par.

NOTE. 12 *Deniers make* 1 *Sol.*
      20 *Sols* —— 1 *Livre.*
      5 *Livres* — 1 *Piece of Eight at* Genoa.
      6 *Livres* — 1 *Piece of Eight at* Leghorn.

N. B. The Exchange at *Florence* is by *Ducatoons,* the Exchange at *Venice* by *Ducats.*

NOTE. 6 *Solidi make* 1 *Grofs.*
      24 *Groffes* - - 1 *Ducat.*
RULE. *The fame as before.*

EXAMPLES.

1. How much *Sterling* Money may a Perfon receive in *London,* if he pays in *Genoa* 976 Dollars, at 53*d. per* Dollar? *Answ.* 215*l*. 10*s*. 8*d.*

2. A Merchant remitted 215*l*. 10*s.* 8*d.* Sterling to *Leghorn,* how many Dollars will he receive there, the Exchange being at 53*d. per* Dollar? *Answ.* 976.

3. A Factor hath fold Goods at *Florence,* for 250 Ducatoons, at 54*d.* each, what is the Value in Pounds *Sterling? Answer,* 56*l*. 5*s.*

4. A Bill of 56*l*. 5*s.* is remitted to *Florence,* to be paid in Ducatoons, at 54*d.* each, how many will be receiv'd? *Answer,* 250.

5. I

5. If 275 Ducats, at 4s. 5d. each, be remitted from *Venice* to *London*, what is the Value in Pounds *Sterling?*
Answer, 60l. 14s. 7d.

6. A Gentleman travelling, would exchange 60l. 14s. 7d. *Sterling* for *Venice* Ducats, at 4s. 5d. each, how many muſt he receive? *Anſwer,* 275.

IV. PORTUGAL.

They keep their Accounts in *Oporto* and *Liſbon,* in *Reas,* and Exchange on the *Milrea*=6s. 8d. ½ at *Par.*
NOTE, 1000 *Reas make* 1 *Milrea.*
RULE *the ſame with* France.

EXAMPLES.

1. A Gentleman being deſirous to remit to his Correſpondent in *London* 2750 Milreas, Exchange at 6s. 5d. *per* Milrea, how much *Sterling* will he be Creditor for in *London?*
Anſwer, 882l. 5s. 10d.

2. If a Bill be drawn from *London* of 882l. 5s. 10d. *Sterling,* how many Milreas at 6s. 5d. each, is equal in Value to the ſaid Sum? *Anſwer,* 2750.

V. HOLLAND, FLANDERS, *and* GERMANY.

They keep their Accounts at *Antwerp, Amſterdam, Bruſ-ſels, Rotterdam,* and *Hamburgh :* Some in *Pounds, Shillings,* and *Pence,* as in *England,* others in *Guilders, Stivers* and *Pennics,* and exchange with us on our *Pound* at 33s. 4d. *Flemiſh,* at Par.
NOTE. 16 *Pennics make* 1 *Stiver.*
        20 *Stivers* —— 1 *Guilder.*
        6 *Stivers* —— 1 *Shilling.*
        6 *Guilders* - - 1 *Pound Flemiſh.*
        To change *Flemiſh* into *Sterling.*
RULE. *As the given Rate* : *is to* 1 *Pound* : : *ſo is the* Flemiſh *Sum* : *to the* Sterling *required.*
        To change *Sterling* into *Flemiſh.*
RULE. *As* 1l. Sterling *is to the given Rate* : : *ſo is the* Sterling *given* : *to the* Flemiſh *ſought.*

I   Ex-

EXAMPLES.

1. Remitted from *London* to *Amsterdam*, a Bill of 754*l*. 10*s.* *Sterling,* how many Pounds *Flemish* is the Sum, the Exchange at 33*s.* 6*d. Flemish, per* Pound *Sterling ?*

Answer, 1263*l.* 15*s.* 9*d. Flem.*

2. A Merchant at *Rotterdam* remits 1263*l.* 15*s.* 9*d. Flemish,* to be paid in *London,* how much *Sterling* Money must he draw for, the Exchange being at 33*s.* 6*d. Flemish, per* Pound *Sterling ?* Answer, 754*l.* 10*s.*

3. If I pay at *Amsterdam* 7254*l.* 15*s. Flemish,* what *Sterling* Money shall I receive at *London,* the Exchange at 33*s.* 9*d. per* Pound *Sterling ?* Answer, 4299*l.* 2*s.* 2*d.* $\frac{1}{2}$.

4. What may I draw a Bill for to *London,* if I pay at *Antwerp* 2754 Guilders, Exchange at 34*s.* 7*d. Flemish, per* Pound *Sterling ?* Answ. 265*l.* 8*s.* 10*d.* $\frac{3}{4}$.

VI. IRELAND.

1. A Gentleman remits to *Ireland* 575*l.* 15*s. Sterling,* what will he receive there, the Exchange being at 10 *per* Cent. ? Answer, 633*l.* 6*s.* 6*d.*

2. What must be paid in *London* for a Remittance of 633*l.* 6*s.* 6*d. Irish,* Exchange at 10 *per Cent.* ?

Answer, 575*l.* 15*s.*

COMPARISON *of* WEIGHTS *and* MEASURES.

EXAMPLES.

1. If 100 Ells *English* make 108 Braces at *Venice,* how many Ells *English* are equal to 1000 Braces at *Venice?* Answ. As 108 *Braces* : 100 *Ells* : : 1000 *Braces* : 925 $\frac{100}{108}$.

2. If 112 *lb.* at *London* make 98 *lb.* at *Roan,* how many *lbs.* at *Roan* are equal to 1000 *lb.* at *London ?* Answer, 875 *lb.*

3. If 100 Ells at *London* make 145 Ells at *Vienna,* how many Ells at *Vienna* are equal to 10 Ells at *London ?*

Answer, 14 $\frac{1}{2}$.

4. If 112 *lb.* at *London* make 99 at *Lisbon,* how many *lb.* at *London* are equal to 1076 *lb.* at *Lisbon ?* Answ. 1217 $\frac{29}{99}$.

CON-

CONJOIN'D PROPORTION

IS when the *Coin*, *Weight*, or *Measures* of several Countries are compared in the same Question, or it is linking together a Variety of Proportions.

When it is required to find how many of the *first* Sort of *Coin*, *Weight*, or *Measure* mentioned in the Question, are equal to a given *Quantity* of the *last*.

RULE. Place the Numbers alternately, beginning at the left Hand, and let the last Number stand on the left Hand ; *then* multiply the first Row continually *for a Dividend*, and the second for a *Divisor*.

PROOF. By as many single Rules of Three as the Question requires.

EXAMPLES.

1. If 25 *lb.* at *London* be equal to 22 *lb.* at *Nurenburgh*, and 88 *lb.* at *Nurenburgh*, 92 *lb.* at *Hamburgh*, 46 *lb.* at *Hamburgh*, 49 *lb.* at *Lyons*, how many *lb.* at *London* are equal to 98 at *Lyons* ? *Answer*, 100.

Left.	Right.	
25	22	$25 \times 88 \times 46 \times 98 = 9917600$. *Then*
88	92	$22 \times 92 \times 49 = 99176) 9917600 (100$
46	49	
98		

2. If 3 Ells *English* make 6 Braces at *Leghorn*, and 150 Braces at *Leghorn* 135 Braces at *Venice*, how many Ells *English* are equal to 27 Braces at *Venice* ? *Answ.* 15.

3. If 100 *lb.* *English* make 95 *lb.* *Flemish*, and 19 *lb.* *Flemish*, 25 *lb.* at *Bolognia*, how many *lbs.* *English* are equal to 50 *lb.* at *Bologna* ? *Answ.* 40.

4. If 6 Braces at *Leghorn* make 3 Ells *English*, 5 Ells *English* 9 Braces at *Venice*, how many Braces at *Leghorn* will make 45 at *Venice* ? *Answ.* 50.

When it is required to find how many of the *last* Sort of *Coin*, *Weight*, or *Measure* mention'd in the Question, is equal to a given *Quantity* of the *first*.

RULE. Place the Numbers alternately, beginning at the left Hand, and let the last Number stand on the right Hand ; then multiply the first Row for a *Divisor*, and the second for a *Dividend*.

EXAMPLES.

1. If 10 *lb.* at *London* make 9 *lb.* at *Amſterdam*, 90 *lb.* at *Amſterdam*, 112 *lb.* at *Thoulouſe*, how many *lb.* at *Thoulouſe* are equal to 50 *lb.* at *London ?* *Anſw.* 56.

2. If 20 Braces at *Leghorn* be equal to 10 Varas at *Liſbon*, 40 Varas at *Liſbon* to 80 Braces at *Lucca*, how many Braces at *Lucca* are equal to 100 Braces at *Leghorn ?* *Anſwer*, 100.

PROGRESSION

Conſiſts in two PARTS:

ARITHMETICAL *and* GEOMETRICAL.

ARITHMETICAL PROGRESSION

IS when a Rank of Numbers increaſe or decreaſe regularly, by the continual *adding* or *ſubtracting* of ſome equal Number : As 1, 2, 3, 4, 5, 6 are in Arithmetical Progreſſion by the continual *increaſing* or *adding* of one, and 11, 9, 7, 5, 3, 1, by the continual *Decreaſe* or *Subtraction* of two.

NOTE. *When any even Number of Terms differ by Arithmetical Progreſſion, the Sum of the two* Extreams *will be equal to the two* middle *Numbers, or any two* Means *equally diſtant from the* Extreams : *As* 2, 4, 6, 8, 10, 12, *where* 6 + 8, *the two middle Numbers, are* = 12 + 2, *the two Extreams, and* = 10 + 4 *the two Means* = 14.

When the Number of Terms are odd, the Double of the middle Term *will be equal to the* two *Extreams, or of any* two Means *equally diſtant from the* middle Term : *As* 1, 2, 3, 4, 5, *where the Double of* 3 = 5 + 1 = 2 + 4 = 6.

In *Arithmetical Progreſſion* five Things are to be obſerved, *viz.*

    1. The firſt Term.
    2. The laſt Term.
    3. The Number of Terms.
    4. The equal Difference.
    5. The Sum of all the Terms.

Any three of which being given, the other two may be found, The *firſt, ſecond,* and *third* Term given to find the *Fifth.*

RULE.

RULE. Multiply the *Sum* of the *two Extreams* by half the *Number* of Terms, or multiply *half* the Sum of the *two Extreams* by the *whole Number* of Terms, the Product is the *Total* of all the Terms.

EXAMPLES.

1. How many Strokes does the Hammer of a Clock ſtrike in 12 Hours ? *Anſ.* 78.

$12 + 1 = 13$ *then* $13 \times 6 = 78$.

2. A Man buys 17 Yards of Cloth, and gave for the firſt Yard 2*s.* and for the laſt, 10*s.* what did the 17 Yards amount to ? *Anſ.* 5*l.* 2*s.*

3. If 100 Eggs were placed in a right Line, exactly a Yard aſunder from one another, and the firſt a Yard from a Baſket, what Length of Ground does that Man go who gathers up theſe 100 Eggs ſingly, returning with every Egg to the Baſket to put it in ? *Anſ.* 5 Miles 1300 Yards.

The *firſt, ſecond* and *third Terms* given to find the *fourth.*

RULE. From the *ſecond* ſubtract the *firſt,* the Remainder *divided* by the *third* leſs *one* gives the *fourth* ?

EXAMPLES.

1. A Man had 8 Sons, the youngeſt was 4 Years old, and the eldeſt 32, they increaſed in Arithmetical Progreſſion, what was the common Difference of their Ages ? *Anſ.* 4.

$32 - 4 = 28$ *then* $28 \div 8 - 1 = 4$ *the common Difference.*

2. A Man is to travel from *London* to a certain Place in 12 Days, and to go but 3 Miles the firſt Day, increaſing every Day by an equal Exceſs, ſo that the laſt Day's Journey may be 58 Miles, what will each Day's Journey be, and how many Miles diſtant is that Place from *London* ?

        3 *Miles the firſt* Day's *Journey.*

$3 + 5 = 8$ *the ſecond Day*

$8 + 5 = 13$ *the third Day,* &c..

The *whole Diſtance is* 366 Miles.

The *firſt, ſecond* and *fourth* Terms given to find the *third.*

RULE. From the *ſecond* ſubtract the *firſt,* the Remainder *divide* by the *fourth,* and to the Quotient add 1, gives the *third.*

EXAMPLES.

1. A Perſon travelling into the Country, went 3 Miles the firſt Day, and increaſed every Day by 5 Miles, till at laſt he went 58 Miles in one Day, how many Days did he travel ? *Anſ.* 12.

$58-3=55$ *then* $55 \div 5=11$ *and* $11+1=12$ *the Number of Days.*

2. A Man being aſked how many Sons he had, ſaid, that the youngeſt was 4 Years old, and the eldeſt 32, and that he increaſed one in his Family every four Years, how many had he? *Anſ.* 8.

The *ſecond, third,* and *fourth* given to find the *firſt.*

RULE. Multiply the *fourth* by the *third,* made *leſs* by 1, the Product ſubtracted from the *ſecond* gives the *firſt.*

EXAMPLES.

1. A Man in 10 Days went from *London* to a certain Town in the Country, every Day's Journey increaſing the former by 4, and the laſt Day he went was 46 Miles, what was the firſt? *Anſw.* 10 *Miles.*

$4 \times \overline{10-1}=36$ *then* $46-36=10,$ *the firſt Day's Journey.*

2. A Man takes out of his Pocket at 8 ſeveral Times, ſo many different Numbers of Shillings, every one exceeding the former by 6; the laſt was 46, what was the firſt?
Anſwer, 4.

The *ſecond, third* and *fifth* given to find the *firſt.*

RULE. *Divide* the *fifth* by the *third,* and from the Quotient *ſubtract Half* the Product of the *fourth* multiplied by the *third leſs* 1, gives the *firſt.*

EXAMPLE.

1. A Man is to receive 360*l.* at 12 ſeveral Payments, each to exceed the former by 4*l.* and is willing to beſtow the firſt Payment on any one that can tell him what it is, what will that Perſon have for his Pains? *Anſwer,* 8*l.*

$$360 \div 12=30 \ \textit{then} \ 30 - \frac{4 \times \overline{12-1}}{2} =8. \ \textit{the firſt Payment.}$$

The *firſt, third,* and *fourth* given to find the *ſecond.*

RULE. Subtract the *fourth* from the Product of the *third* multiplied by the *fourth,* that Remainder added to the *firſt,* gives the *ſecond.*

EXAMPLE.

1. What is the laſt Number of an Arithmetical Progreſſion, beginning at 6, and continuing by the Increaſe of 8 to 20 Places? *Anſwer.* 158.

$\overline{20 \times 8} - 8=152 \ \textit{then} \ 152+6=158, \ \textit{the laſt Number.}$

GEO-

GEOMETRICAL PROGRESSION.

Is the increaſing or decreaſing of any Rank of Numbers by ſome common *Ratio*, that is by the continual *Multiplication*, or *Diviſion* of ſome equal Number : *As* 2, 4, 8, 16 *increaſe* by the Multiplier 2, and 16, 8, 4, 2 *decreaſe* by the Diviſor 2.

NOTE. *When any Number of Terms is continued in Geometrical Progreſſion, the Product of the two* Extreams *will be equal to any* two Means, *equally diſtant from the* Extreams : *As* 2, 4, 8, 16, 32, 64, *where* 64 × 2 *are* = 4 × 32, *and* 8 × 16 = 128.

When the Number of Terms are odd, *the* middle Term *multiplied into itſelf will be* equal *to the* two Extreams, *or any* two Means *equally diſtant from the* mean : *As* 2, 4, 8, 16, 32, *where* 2 × 32 = 4 × 16 = 8 × 8 = 64.

In *Geometrical Progreſſion* the ſame five Things are to be obſerved, as in *Arithmetical, viz.*

 1. The firſt Term.
 2. The laſt Term.
 3. The Number of Terms.
 4. The equal Difference or Ratio.
 5. The Sum of all the Terms.

NOTE. *As the laſt Term in a long Series of Numbers is very tedious to come at, by continual Multiplication ; therefore, for the readier finding it out, there is a Series of Numbers made uſe of in* Arithmetical Proportion, *called* Indices, *beginning with an* Unit *whoſe common* Difference *is* one, *whatever Number of* Indices *you make uſe of, ſet as many* Numbers (*in ſuch* Geometrical Proportion *as is given in the Queſtion*) *under them :*

As 1, 2, 3, 4, 5, 6 *Indices.*
 2, 4, 8, 16, 32, 64 *Numbers in Geometrical Proportion.*

But if the firſt Term *in* Geometrical Proportion *be* different *from the* Ratio, *the* Indices *muſt begin with* a Cypher.

As 0, 1, 2, 3, 4, 5, 6. *Indices.*
 1, 2, 4, 8, 16, 32, 64. *Numbers in Geometrical Proportion.*

When the Indices *begin with* a Cypher, *the Sum of the* Indices *made choice of muſt be always one* leſs *than the Number of Terms given in the Queſtion,* for 1 *in the* Indices *is over the ſecond* Term, *and two over the third,* &c.

Add any two of the Indices *together, and that* Sum *will agree with the* Product *of their reſpective Terms.*

A

As in the firſt Table of Indices 2 $+$ 5 $=$ 7 *then in the ſecond* 2 $+$ 4 $=$ 6
Geometrical Proportion $\quad$ 4 $\times$ 32 $=$ 128 $\qquad\qquad$ 4 $\times$ 16 $=$ 64

In any *Geometrical Progreſſion* proceeding from *Unity,* the *Ratio* being known, to find any remote Term, without producing all the *intermediate Terms.*

RULE. Find what Figures of the *Indices* added together would give the *Exponent* of the *Term* wanted, then multiply the Numbers ſtanding under ſuch *Exponent* into each other, and it will give the *Term* required.

Note. *When the* Exponent 1 *ſtands over the* ſecond Term, *the Number of* Exponents *muſt be one* leſs *than the Number of* Terms.

E X A M P L E S.

1. A Man agrees for 12 Peaches, to pay only the Price of the laſt, reckoning a Farthing for the firſt, an Halfpenny for the ſecond, &c. doubling the Price to the laſt, what muſt he give for them ? *Anſw.* 2*l.* 2*s.* 8*d.*

$$16 = 4$$
$$16 = 4$$

0, 1, 2, 3, 4, *Exponents* $\qquad\qquad\qquad\overline{}$
1, 2, 4, 8, 16. *Numb. of Terms* $\qquad\quad 256 = 8$
$$\qquad\qquad\qquad\qquad\qquad\qquad 8 = 3$$

for 4 $+$ 4 $+$ 3 $=$ 11, *Number of Terms* leſs 1. $\quad$ 4)2048 $=$ 11 N°. *of Far.*

$$12)512$$

$$2|0)4|2 \qquad 8$$

$$\overline{\qquad\qquad 2\ \ 2 \qquad 8}$$

2. A Country Gentleman going to a Fair to buy ſome Oxen, meets with a Perſon who had 23, he demanding the Price of them, was anſwered, 16*l.* a Piece ; the Gentleman bids him 15*l.* a Piece, and he would buy all; the other tells him it would not be taken, but if he would give what the laſt Ox would come to, at a Farthing for the firſt, and doubling it to the laſt, he ſhould have all. What was the Price of the Oxen ? *Anſ.* 4369*l.* 1*s.* 4*d.*

In any *Geometrical Progreſſion,* not proceeding from *Unity,* the *Ratio* being given, to find any remote *Term,* without producing all the *intermediate Terms.*

RULE.

RULE. Proceed as in the *laſt*, only obſerve that every *Product* muſt be divided by the *firſt Term*.

EXAMPLES.

1. A Sum of Money is to be divided among eight Perſons, the firſt to have 20*l.* the ſecond 60*l.* and ſo on in triple Proportion, what will the laſt have? *Anſ.* 43740*l.*

0. 1. 2. 3. $\dfrac{540 \times 540}{20} = 14580$ *then* $\dfrac{14580 \times 60}{20} = 43740$

20. 60. 180. 540.

$3 + 3 + 1 = 7$ *one leſs than the Number of Terms.*

2. A Gentleman dying left 9 Sons, to whom and to his Executors, he bequeathed his Eſtate in Manner following: to his Executor 50 *l.* his youngeſt Son was to have as much more as the Executor, and each Son to exceed the next younger by as much more, what was the Eldeſt Son's Portion? *Anſ.* 12800*l.*

The *firſt Term*, *Ratio*, and Number of *Terms* given, to find the *Sum* of all the *Terms*.

RULE. Find the *laſt Term* as before, then ſubtract the *firſt* from it, and *divide* the Remainder by the *Ratio* leſs *one*, to the Product of which add the *greater*, gives the *Sum* required.

EXAMPLES.

1. A Servant ſkill'd in Numbers agreed with a Gentleman to ſerve him 12 Months, provided he would give him a Farthing for his Firſt Month's Service, a Penny for the ſecond, and 4*d.* for the third, &*c.* what did his Wages amount to? *Anſ.* 525*l.* 8*s.* 5*d.* ¼.

0. 1. 2. 3.   4. $256 \times 256 = 65536$, then $65536 \times 64 = 4194304$

1. 4. 16. 64. 256.   *then* $\dfrac{4194304 - 1}{4 - 1} = 1398101$. *then*

$4 + 4 + 3 = No.$ *of Terms leſs* 1.

$1398101 + 4194304 = 5592405$ *Farthings.*

2. A Man bought a Horſe, and by Agreement was to give a Farthing for the firſt Nail, three for the ſecond, &*c.* there were 4 Shoes, and in each Shoe 8 Nails, what was the Worth of the Horſe? *Anſ.* 965114681693*l.* 13*s.* 4*d.*

3. A certain Perſon married his Daughter on New-years Day, and gave her Huſband one Shilling towards her Portion, promiſing to double it, on the firſt Day of every Month for one Year, what was her Portion? *Anſ.* 204*l.* 15*s.*

4. A Laceman well verſed in Numbers agreed with a Gentleman to ſell him 22 Yards of rich Gold brocaded Lace,

for

for 2 Pins the firſt Yard, 6 Pins the ſecond, &c. in triple Proportion. I deſire to know what he ſold the Lace for, if the Pins were valued at 100 for a Farthing, alſo what the Laceman got or loſt by the Sale thereof, ſuppoſing the Lace ſtood him in 7*l. per Yard?*

Anſ. the Lace ſold for 326886*l.* 0*s.* 9*d.*
Gain 326732   0   9

PERMUTATION

IS the changing or varying the Order of Things.
RULE. Multiply all the given Terms, one into another, and the laſt Product will be the Number of Changes required.

EXAMPLES.

1. How many Changes may be rung upon 12 Bells, and how long would they be in ringing but once over, ſuppoſing 10 Changes might be rung in one Minute, and the Year to contain 365 Days, 6 hours?
$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8 \times 9 \times 10 \times 11 \times 12 = 479001600$ *Changes, which* ÷ 10 = 47900160 *Minutes, and if reduced,* is = 91 *Years,* 3 *Weeks, and* 5 *Days,* 6 *Hours.*

2. A young Scholar coming into a Town for the Conveniency of a good Library, demands of a Gentleman with whom he lodged, what his Diet would coſt for a Year, who told him 10 Pounds; but the Scholar not being certain what Time he ſhould ſtay, aſked him what he muſt give him for ſo long as he could place his Family (conſiſting of ſix Perſons beſides himſelf) in different Poſitions, every Day at Dinner, the Gentleman thinking it could not be long, tells him 5*l.* to which the Scholar agrees, what Time did the Scholar ſtay with the Gentleman? *Anſ.* 5040 *Days.*

THE

THE
TUTOR's ASSISTANT.

PART II.

VULGAR FRACTIONS.

A FRACTION is a Part or Parts of an *Unit*, and written with two Figures, with a Line between them, as, $\frac{1}{4}$, $\frac{2}{6}$, $\frac{3}{8}$ &c.

The Figure above the Line is called the *Numerator*, and the under one the *Denominator*, which ſhews how many Parts the Unit is divided into, and the *Numerator* ſhews how many of thoſe Parts are meant by the Fraction.

There are four Sorts of Vulgar Fractions, *Proper, Improper, Compound,* and *Mixed,* viz.

1. A PROPER FRACTION is when the Numerator is *leſs* than the Denominator, as $\frac{2}{4}$, $\frac{3}{6}$.

2. An IMPROPER FRACTION is when the Numerator is *greater* than the Denominator, as, $\frac{8}{4}$.

3. A COMPOUND FRACTION is the Fraction of a Fraction, and known by the Word *of*, as, $\frac{1}{2}$ *of* $\frac{2}{3}$.

4. A MIXED NUMBER *or* FRACTION is compoſed of an whole Number and Fraction, as, $8\frac{2}{7}$.

REDUCTION *of* VULGAR FRACTIONS.

1. TO *reduce Fractions to a common Denominator*.

RULE. Multiply each Numerator into all the Denominators, except its own, for a new Numerator, and all the Denominators for a common Denominator.

EXAMPLES.

1. Reduce $\frac{2}{4}$ and $\frac{4}{7}$ to a common Denominator, *Facit* $\frac{14}{28}$, and $\frac{16}{28}$.

2 × 7

first num.   *2d num.*

$2 \times 7 = 14$ $4 \times 4 = 16$ *then* $4 \times 7 = 28$ *den.* $= \frac{14}{28}$ *and* $\frac{16}{28}$.

2. Reduce $\frac{1}{2}$, $\frac{3}{4}$, and $\frac{5}{8}$ to a common Denominator. *Facit* $\frac{32}{64}$, $\frac{48}{64}$, $\frac{40}{64}$.

3. Reduce $\frac{7}{8}$, $\frac{4}{6}$, $\frac{9}{10}$, and $\frac{6}{7}$ to a common Denominator. *Facit* $\frac{2240}{3360}$, $\frac{2240}{3360}$, $\frac{3024}{3360}$, $\frac{2880}{3360}$.

4. Reduce $\frac{6}{10}$, $\frac{2}{4}$, $\frac{1}{7}$, and $\frac{3}{6}$ to a common Denominator. *Facit* $\frac{1008}{1680}$, $\frac{840}{1680}$, $\frac{240}{1680}$, $\frac{840}{1680}$.

5. Reduce $\frac{4}{5}$, $\frac{2}{3}$, $\frac{3}{7}$, and $\frac{1}{9}$ to a common Denominator. *Facit* $\frac{672}{840}$, $\frac{560}{840}$, $\frac{360}{840}$, $\frac{105}{840}$.

6. Reduce $\frac{2}{6}$, $\frac{5}{9}$, $\frac{2}{8}$, and $\frac{3}{5}$ to a common Denominator. *Facit* $\frac{720}{2160}$, $\frac{1200}{2160}$, $\frac{540}{2160}$, $\frac{1296}{2160}$.

2. *To reduce a Vulgar Fraction to its* lowest Terms.

Rule. Find a common Measure by dividing the lower Term by the upper, and that Divisor by the Remainder following, till nothing remain; the last Divisor is the common Measure, then divide both Parts of the Fraction by the common Measure, and the Quotients will give the Fraction required.

Note, *If the common Measure happen to be* 1, *the Fraction is already in its lowest Term; and when a Fraction hath Cyphers at the right Hand, it may be abbreviated, by cutting them off; as* $\frac{4|0}{3|0}$.

Examples.

1. Reduce $\frac{24}{32}$ to its lowest Terms.   *Facit* $\frac{3}{4}$.

$24)32(1$ *then* $8)\frac{24}{32}(=\frac{3}{4}$

$8)24(3$

2. Reduce $\frac{30}{125}$ to its lowest Terms.   *Facit* $\frac{6}{25}$.
3. Reduce $\frac{208}{684}$ to its lowest Terms.   *Facit* $\frac{52}{171}$.
4. Reduce $\frac{192}{576}$ to its lowest Terms.   *Facit* $\frac{3}{9}$.
5. Reduce $\frac{825}{960}$ to its lowest Terms.   *Facit* $\frac{165}{192}$.
6. Reduce $\frac{5184}{6912}$ to its lowest Terms. *Facit* $\frac{3}{4}$.

3. *To reduce a mixed Number to an improper Fraction.*

Rule. Multiply the whole Number by the Denominator of the Fraction, and to the Product add the Numerator for a new Numerator, which place over the Denominator.

Note, *To express an whole Number Fraction-ways, set* 1 *for the Denominator given.*

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EXAMPLES.

1. Reduce $18\frac{3}{7}$ to an improper Fraction. *Facit* $\frac{129}{7}$.

$18 \times 7 + 3 = 129$ *new numerator,* $\frac{129}{7}$.

2. Reduce $56\frac{13}{22}$ to an improper Fraction, *Facit* $\frac{1245}{22}$.
3. Reduce $183\frac{5}{21}$ to an improper Fraction. *Facit* $\frac{3848}{21}$.
4. Reduce $13\frac{4}{5}$ to an improper Fraction. *Facit* $\frac{69}{5}$.
5. Reduce $27\frac{2}{9}$ to an improper Fraction. *Facit* $\frac{245}{9}$.
6. Reduce $514\frac{5}{16}$ to an improper Fraction. *Facit* $\frac{8229}{16}$.

4. *To reduce an improper Fraction to its proper Terms.*

RULE. Divide the upper Term by the lower.

EXAMPLES.

1. Reduce $\frac{129}{7}$ to its proper Terms. *Facit* $18\frac{3}{7}$.

$129 \div 7 = 18\frac{3}{7}$.

2. Reduce $\frac{1245}{22}$ to its proper Terms. *Facit* $56\frac{13}{22}$.
3. Reduce $\frac{3848}{21}$ to its proper Terms. *Facit* $183\frac{5}{21}$.
4. Reduce $\frac{69}{5}$ to its proper Terms. *Facit* $13\frac{4}{5}$.
5. Reduce $\frac{242}{9}$ to its proper Terms. *Facit* $27\frac{2}{9}$.
6. Reduce $\frac{8229}{16}$ to its proper Terms. *Facit* $514\frac{5}{16}$.

5. *To Reduce a Compound Fraction to a single one.*

RULE. Multiply all the Numerators for a new Numerator, and all the Denominators for a new Denominator.

EXAMPLES.

1. Reduce $\frac{2}{3}$ of $\frac{3}{5}$ of $\frac{5}{8}$ to a single Fraction. *Facit* $\frac{30}{120}$.
2. Reduce $\frac{5}{9}$ of $\frac{4}{7}$ of $\frac{11}{12}$ to a single Fraction. *Facit* $\frac{220}{756}$.
3. Reduce $\frac{11}{12}$ of $\frac{13}{14}$ of $\frac{21}{29}$ to a single Fraction. *Facit* $\frac{3003}{4872}$.
4. Reduce $\frac{3}{4}$ of $\frac{5}{6}$ of $\frac{9}{10}$ to a single Fraction. *Facit* $\frac{135}{240}$.
5. Reduce $\frac{4}{5}$ of $\frac{6}{8}$ of $\frac{7}{9}$ to a single Fraction. *Facit* $\frac{168}{360}$.
6. Reduce $\frac{2}{7}$ of $\frac{5}{9}$ of $\frac{8}{10}$ to a single Fraction. *Facit* $\frac{80}{630}$.

6. *To reduce Fractions of one Denomination to the Fraction of another, but greater, retaining the same Value.*

RULE. Reduce the given Fraction to a compound one, by comparing it with all the Denominations between it, and that Denomination which you would reduce it to ; then reduce that compound Fraction to a single one.

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Examples.

1. Reduce $\frac{7}{8}$ of a Penny to the Fraction of a Pound. *Facit* $\frac{7}{8}$ of $\frac{1}{12}$ of $\frac{1}{20} = \frac{7}{1920}$. *l.*

2. Reduce $\frac{1}{4}$ of a Penny to the Fraction of a Pound. *Facit* $\frac{1}{960}$ *l.*

3. Reduce $\frac{4}{5}$ of a *dwt.* to the Fraction of a *lb.* Troy. *Facit* $\frac{4}{1200}$ *lb.*

4. Reduce $\frac{4}{7}$ of a *lb.* Avoirdupoife to the Fraction of an *cwt. Facit* $\frac{4}{784}$ *cwt.*

7. *To reduce Fractions of one Denomination to the Fraction of another,* but lefs, *retaining the fame Value.*

Rule. Multiply the Numerator by the Parts contained in the feveral Denominations between it, and that you would reduce it to, for a new Numerator, and place it over the given Denominator.

Examples.

1. Reduce $\frac{1}{1920}$ of a *l.* to the Fraction of a Penny. *Facit* $\frac{7}{8}$ of a Penny.

$7 \times 20 \times 12 = 1680$ $\frac{1680}{1920}$ *reduced to its loweft Terms* $= \frac{7}{8}d.$

2. Reduce $\frac{1}{960}$ of a *l.* to the Fraction of a Penny. *Facit* $\frac{1}{4}$ *d.*

3. Reduce $\frac{4}{1200}$ of a *lb.* Troy to the Fraction of a Penny-weight. *Facit* $\frac{4}{5}$ *dwt.*

4. Reduce $\frac{4}{784}$ of an *cwt.* to the Fraction of a *lb. Facit* $\frac{4}{7}$. *lb.*

8. *To reduce Fractions of one Denomination to another of the fame Value, having the Numerator given of the required Fraction.*

Rule. As the *Numerator* of the *given Fraction* : is to its *Denominator* : : fo is the *Numerator* of the *intended Fraction* : to its *Denominator.*

Examples.

1. Reduce $\frac{2}{3}$ to a Fraction of the fame Value, whofe Numerator fhall be 12. *As* 2 : 3 : : 12 : 18. *Facit* $\frac{12}{18}$.

2. Reduce $\frac{5}{7}$ to a Fraction of the fame Value, whofe Numerator fhall be 25. *Facit* $\frac{25}{35}$.

3. Reduce $\frac{5}{7}$ to a Fraction of the fame Value, whofe Numerator fhall be 47. *Facit* $\frac{47}{65}\frac{1}{5}$.

9. *To*

9. *To reduce Fractions from one Denomination to another of the same Value, having the Denominator given of the Fraction required.*

RULE. As the *Denominator* of the *given Fraction* is to its *Numerator,* so is the *Denominator of the intended Fraction* to its *Numerator.*

EXAMPLES.

1. Reduce $\frac{2}{3}$ to a Fraction of the same Value, whose Denominator shall be 18. As 3 : 2 :: 18 : 12 *Facit* $\frac{12}{18}$.

2. Reduce $\frac{4}{5}$ to a Fraction of the same Value, whose Denominator shall be 35. *Facit* $\frac{28}{35}$.

3. Reduce $\frac{5}{7}$ to a Fraction of the same Value, whose Denominator shall be $65\frac{1}{3}$. *Facit* $\dfrac{47}{65\frac{1}{3}}$.

10. *To reduce a mixed Fraction to a single one.*

RULE. When the Numerator is the integral Part, multiply it by the Denominator of the fractional Part, adding in the Numerator of the fractional Part, for a new Numerator, then multiply the Denominator of the Fraction by the Denominator of the fractional Part for a new Denominator.

EXAMPLES.

1. Reduce $\dfrac{42\frac{7}{8}}{49}$ to a simple Fraction. *Facit* $\frac{343}{392} = \frac{7}{8}$.

$42 \times 8 + 7 = \underline{343}$ *Numerator*
$49 \times 8 \quad = 392$ *Denominator.*

2. Reduce $\dfrac{34\frac{1}{2}}{46}$ to a simple Fraction, *Facit* $\frac{69}{92} = \frac{3}{4}$.

When the Denominator is the integral Part, multiply it by the Denominator of the fractional Part, adding in the Numerator of the fractional Part for a new Denominator, then multiply the Numerator of the Fraction by the Denominator of the fractional Part for a new Numerator.

EXAMPLES.

1. Reduce $\dfrac{47}{65\frac{1}{3}}$ to a simple Fraction. *Facit* $\frac{235}{329} = \frac{5}{7}$.

2. Reduce $\dfrac{73}{131\frac{2}{3}}$ to a simple Fraction. *Facit* $\frac{365}{657} = \frac{5}{9}$.

11. *To*

11. *To find the proper Quantity of a Fraction in the known Parts of an Integer.*

Rule. Multiply the Numerator by the common Parts of the Integer, and divide by the Denominator.

Examples.

1. Reduce $\frac{3}{4}$ of a Pound *Sterling* to its proper Quantity, $3 \times 20 = 60 \div 4 = 15s$. *Facit* 15s.

2. Reduce $\frac{2}{3}$ of a Shilling to its proper Quantity. *Facit* 4d. 3 qrs. $\frac{1}{3}$.

3. Reduce $\frac{4}{7}$ of a *lb.* Avoirdupoise to its proper Quantity. *Facit* 9 oz. 2 dr. $\frac{2}{7}$.

4. Reduce $\frac{7}{9}$ of an *cwt.* to its proper Quantity? *Facit* 3 qrs. 3 lb. 1 oz. 12 dr. $\frac{4}{9}$.

5. Reduce $\frac{3}{5}$ of a *lb. Troy* to its proper Quantity. *Facit* 7 oz. 4 dwt.

6. *Reduce* $\frac{5}{6}$ of an Ell *English* to its proper Quantity. *Facit* 2 qrs. 3 nails $\frac{1}{3}$.

7. Reduce $\frac{4}{5}$ of a Mile to its proper Quantity. *Facit* 6 Furlongs 16 Poles.

8. Reduce $\frac{5}{8}$ of an Acre to its proper Quantity. *Facit* 2 roods, 20 poles.

9. Reduce $\frac{6}{7}$ of an Hogshead of Wine to its proper Quantity. *Facit* 54 gallons.

10. *Reduce* $\frac{3}{9}$ of a Barrel of Beer to its proper Quantity. *Facit* 12 gallons.

11. Reduce $\frac{5}{12}$ of a Chaldron of Coals to its proper Quantity. *Facit* 15 bush.

12. Reduce $\frac{3}{5}$ of a Month to its proper Quantity. *Facit* 2 weeks, 2 days 19 hours $\frac{1}{5}$.

12. *To reduce any given Quantity to the Fraction of any greater Denomination retaining the same Value.*

Rule. Reduce the given Quantity to the lowest Term mentioned for a Numerator, under which set the Integral Part (reduced to the same Term) for a Denominator, and it will give the Fraction required.

Examples.

1 Reduce 15s. to the Fraction of a Pound *Sterling*, *Facit* $\frac{15}{20} = \frac{3}{4}$ *l.*

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2. Reduce 4*d.* 3 *qrs.* $\frac{1}{5}$ to the Fraction of a Shilling, *Facit* $\frac{2}{5}$ *s.*

3. Reduce 9 *oz.* 2 *dr.* $\frac{2}{7}$ to the Fraction of a *lb.* Avoirdupois. *Facit* $\frac{4}{7}$.

4. Reduce 3 *qrs.* 3 *lb.* 1 *oz.* 12 *dr.* $\frac{4}{9}$ to the Fraction of an *cwt.* *Facit* $\frac{7}{9}$.

5. Reduce 7 *oz.* 4 *dwt.* to the Fraction ot a *lb.* Troy. *Facit* $\frac{3}{5}$.

6. Reduce 2 Quarters 3 Nails $\frac{1}{9}$ to the Fraction of an *English* Ell. *Facit* $\frac{5}{9}$.

7. Reduce 6 Furlongs 16 Poles, to the Fraction of a Mile. *Facit* $\frac{4}{5}$.

8. Reduce 2 Roods 23 Poles to the Fraction of an Acre. *Facit* $\frac{5}{8}$.

9. Reduce 54 Gallons to the Fraction of an Hogshead of Wine. *Facit* $\frac{6}{7}$.

10. Reduce 12 Gallons to the Fraction of a Barrel of Beer. *Facit* $\frac{3}{9}=\frac{1}{3}$.

11. Reduce 15 Bushels to the Fraction of a Chaldron of Coals. *Facit* $\frac{5}{12}$.

12. Reduce 2 Weeks, 2 Days, 19 Hours, $\frac{1}{5}$ to the Fraction of a Month. *Facit* $\frac{3}{5}$.

ADDITION of Vulgar Fractions.

Rule 1. REDUCE the given Fractions to a common Denominator; then add all the Numerators together, under which place the common Denominator.

Examples.

1. Add $\frac{2}{3}$ and $\frac{5}{7}$ together. *Facit* $\frac{14}{21}+\frac{15}{21}=\frac{29}{21}=1\frac{8}{21}$.

2. Add $\frac{3}{4}$, $\frac{2}{7}$, and $\frac{5}{6}$ together. *Facit* 1 $\frac{146}{168}$.

3. Add $\frac{1}{5}$, 4$\frac{1}{3}$, and $\frac{2}{5}$ together. *Facit* 4$\frac{70}{75}$.

4. Add $\frac{1}{3}$ of 95, and $\frac{7}{8}$ of 14 together. *Facit* 43$\frac{22}{24}$.

5. Add $\frac{1}{2}$ of $\frac{7}{8}$, and $\frac{2}{3}$ of $\frac{19}{20}$ together. *Facit* 1 $\frac{68}{960}$.

6. Add 12 $\frac{1}{2}$, 3$\frac{2}{3}$, and 4$\frac{3}{4}$ together. *Facit* 20$\frac{22}{24}$.

2. When the Fractions are of several Denominations, reduce them to their proper Quantities, and add as before.

7. Add $\frac{1}{4}$ of a Pound to $\frac{5}{6}$ of a Shilling. *Facit* 15*s.* 10*d.*

8. Add $\frac{1}{2}$ of a Penny to $\frac{2}{3}$ of a Pound. *Facit* 13*s.* 4*d.* $\frac{1}{2}$.

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9. Add

9. Add $\frac{3}{4}$ of a *lb.* Troy to $\frac{1}{8}$ of an Ounce. *Facit* 9 *oz.* 3 *dwt.* $\frac{2}{3}$. *gr.*

10. Add $\frac{4}{5}$ of a Ton to $\frac{5}{6}$ of a *lb.* *Facit* 16 *cwt.* 0 *qr.* 13 *oz.* 5 *dr.* $\frac{1}{3}$.

11. Add $\frac{2}{3}$ of a Chaldron to $\frac{3}{4}$ of a Bushel. *Facit* 24 *Bush.* 3 *Pecks.*

12. Add $\frac{1}{6}$ of a Yard to $\frac{2}{3}$ of an Inch. *Facit* 6 *In.* 2 *bc.*

SUBTRACTION *of* VULGAR FRACTIONS.

RULE 1. REDUCE the given Fractions to a common Denominator, then subtract the lesser Numerator from the greater, and place the Remainder over the common Denominator.

2. When the lower Fraction is greater than the upper, subtract the Numerator of the lower Fraction from the Denominator, and to that Difference add the upper Numerator, carrying one to the Units Place of the lower whole Number.

EXAMPLES.

1. From $\frac{3}{4}$ take $\frac{5}{7}$. *Facit* $\frac{1}{28}$.
2. From $\frac{5}{6}$ take $\frac{3}{5}$ of $\frac{5}{8}$. *Facit* $\frac{11}{24}$.
3. From $5\frac{2}{3}$ take $\frac{9}{10}$. *Facit* $4\frac{23}{30}$.
4. From $\frac{38}{47}$ take $\frac{3}{5}$. *Facit* $\frac{49}{235}$.
4. From $\frac{19}{20}$ take $\frac{1}{7}$ of $\frac{2}{3}$. *Facit* $\frac{359}{420}$.
6. From $71\frac{1}{2}$ take $1\frac{7}{19}$ *Facit* $70\frac{23}{38}$.

When the Fractions are of several Denominations, reduce them to their proper Quantities, and subtract as before.

7. From $\frac{3}{4}$ of a Pound, take $\frac{3}{4}$ of a Shilling. *Facit* 14s. 3d.
8. From $\frac{2}{3}$ of a Shilling take $\frac{1}{2}$ of a Penny. *Facit* 7d. $\frac{1}{2}$.
9. From $\frac{3}{4}$ of a *lb.* Troy, take $\frac{1}{8}$ of an Ounce. *Facit* 8 *oz.* 16 *dwt.* 16 *gr.*
10. From $\frac{4}{5}$ of a Ton take $\frac{5}{6}$ of a *lb.* *Facit* 15 *cwt.* 3 *qrs.* 27 *lb.* 2 *oz.* 10 *dwt.* $\frac{5}{6}$.
11. From $\frac{2}{3}$ of a Chaldron take $\frac{3}{4}$ of a Bushel. *Facit* 23 *bush.* 1 *peck.*
12. From $\frac{1}{6}$ of a Yard, take $\frac{2}{3}$ of an Inch. *Facit* 5 *in.* 1 *bc.*

MULTIPLICATION *of* VULGAR FRACTIONS.

RULE. PREPARE the given Numbers (if they require it) by the Rules of Reduction, then multiply the Numerators together for a new Numerator, and the Denominators for a new Denominator. Note.

Note. *When any Number, either whole or mixed, is multiplied by a Fraction, the Product will be always less than the Multiplicand, in the same Proportion as the multiplying Fraction is less than an Unit.*

EXAMPLES.

1. Multiply $\frac{3}{4}$ by $\frac{3}{5}$. *Facit* $3 \times 3 = 9$ *num.* $4 \times 5 = 20$ *de n.* $= \frac{9}{20}$.
2. Multiply $\frac{7}{9}$ by $\frac{2}{3}$.   *Facit* $\frac{14}{27}$.
3. Multiply $48 \frac{3}{5}$ by $13 \frac{5}{6}$.   *Facit* $672 \frac{9}{30}$.
4. Multiply $430 \frac{6}{0}$ by $18 \frac{3}{7}$.   *Facit* $7935 \frac{24}{70}$.
5. Multiply $\frac{16}{21}$ by $\frac{3}{4}$ of $\frac{5}{7}$ of $\frac{4}{3}$.   *Facit* $\frac{96}{294} = \frac{16}{49}$.
6. Multiply $\frac{9}{10}$ by $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$. *Facit* $\frac{3}{8}$.
7. Multiply $\frac{3}{4}$ of $\frac{2}{3}$ by $\frac{2}{3}$ of $\frac{1}{3}$.   *Facit* $\frac{1}{9}$.
8. Multiply $\frac{1}{2}$ of 7 by $\frac{3}{6}$. *Facit* $1 \frac{9}{12}$.
9. Multiply $4 \frac{1}{2}$ by $\frac{1}{8}$.   *Facit* $\frac{9}{16}$.
10. Multiply 24 by $\frac{2}{3}$.   *Facit* 16.
11. Multiply $\frac{4}{5}$ of 91 by $71 \frac{1}{2}$. *Facit* $5205 \frac{2}{10}$.
12. Multiply $9 \frac{1}{2}$ by $\frac{2}{6}$.   *Facit* $3 \frac{1}{6}$.

DIVISION *of* VULGAR FRACTIONS.

RULE. PREPARE the given Numbers (if they require it) by the Rules of Reduction, then multiply the Denominator of the Divisor into the Numerator of the Dividend for a new Numerator, and the Numerator of the Divisor into the Denominator of the Dividend for a new Denominator.

Note. *When any whole Number is Divided by a Fraction less than Unity, the Quotient will be greater than the Dividend. But if any Fraction be divided by a whole Number greater than Unity the Quotient will be less than the Dividend.*

EXAMPLES.

1. Divide $\frac{9}{20}$ by $\frac{3}{5}$. $5 \times 9 = 45$, *Num.* $3 \times 20 = 60$ *den.* $\frac{45}{60} = \frac{3}{4}$.
2. Divide $\frac{14}{27}$ by $\frac{2}{3}$. *Facit* $\frac{7}{9}$.
3. Divide $672 \frac{9}{30}$ by $13 \frac{5}{6}$ *Facit* $48 \frac{3}{5}$.
4. Divide $7935 \frac{24}{70}$ by $18 \frac{3}{7}$. *Facit* $430 \frac{6}{10}$.
5. Divide $\frac{3}{8}$ by $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$. *Facit* $\frac{9}{10}$.
6. Divide $\frac{1}{3}$ of 19. by $\frac{2}{3}$ of $\frac{3}{4}$. *Facit* $7 \frac{18}{30}$.
7. Divide $\frac{2}{3}$ of $\frac{3}{4}$ by $\frac{1}{2}$ of $\frac{2}{3}$. *Facit* $1 \frac{1}{2}$.
8. Divide $9 \frac{2}{12}$ by $\frac{1}{2}$ of 7. *Facit* $2 \frac{52}{84}$.
9. Divide $\frac{9}{10}$ by $4 \frac{1}{2}$. *Facit* $\frac{1}{8}$.

10. Di-

10. Divide 16 by 24. *Facit* $\frac{2}{3}$.
11. Divide 5205 $\frac{2}{10}$ by $\frac{4}{5}$ of 91 *Facit* 71 $\frac{1}{2}$.
12. Divide 3 $\frac{1}{6}$ by 9 $\frac{2}{2}$. *Facit* $\frac{2}{6}$.

The SINGLE RULE *of* THREE DIRECT,
in VULGAR FRACTIONS.

RULE. REDUCE the Numbers as before directed in Reduction, so that the first and third may be of the same Name, multiply the Numerator of the first Fraction by the Denominator of the second and third, for a new Denominator, then multiply the Denominator of the first Fraction by the Numerator of the second and third for a new Numerator, that Fraction will be the Answer to the Question, which reduce to its proper Quantity — or when the 3 Terms are properly reduced, proceed as in the Rule of Three of whole Numbers.

EXAMPLES.

1. If $\frac{3}{4}$ of a Yard cost $\frac{5}{8}$ of a *l.* what will $\frac{9}{10}$ of a Yard come to at that Rate? *Anf.* $\frac{18}{24}l.$ = 15 *s.*
$\frac{3}{4}$ *yds.* : $\frac{5}{8}l.$ :: $\frac{9}{10}$ *yds.* : $\frac{18}{24}l.$
for $4 \times 5 \times 9 = 180$ *num.* or $\frac{5}{8} \times \frac{9}{10} = \frac{45}{80} \frac{3}{4}) \frac{45}{80} (\frac{180}{240}$
and $3 \times 8 \times 10 = 240$ *den.*

2. If $\frac{5}{6}$ of a Yard cost $\frac{2}{3}l.$ what will $\frac{11}{12}$ Yard cost?
Anfwer, 14*s.* 8*d.*

3. If $\frac{4}{7}$ Ells cost $\frac{7}{13}l.$ what will 1 Ell cost?
Anfwer. 18*s.* 10*d.* $\frac{8}{52}$.

4. If $\frac{7}{8}$ *lb.* cost $\frac{3}{4}$ *s.* how much will $\frac{8}{9}$ of *s.* buy?
Anfwer. 1 *lb.* $\frac{8}{216}$.

5. If $\frac{3}{5}$ Ell of Holland cost $\frac{1}{3}l.$ what will 12 Ells $\frac{2}{3}$ cost at that Rate? *Anfwer* 7*l.* 0*s.* 8*d.* 3 *qrs.* $\frac{15}{27}$.

6. If 6 Yards $\frac{1}{2}$ cost 18*s.* what cost 9 Yards $\frac{1}{4}$?
Anfwer, 1*l.* 5*s.* 7*d.* 1*qr.* $\frac{28}{54}$.

7. If $\frac{9}{10}$ of *cwt.* cost 284*s.* what will 7 *cwt.* $\frac{1}{2}$ cost at the same Rate? *Anfwer,* 118*l.* 6*s.* 8*d.*

8. If 3 Yards of Broad-Cloth cost 2*l.* $\frac{4}{5}$, what will 10 Yards $\frac{2}{7}$ cost? *Anfwer,* 9*l.* 12*s.*

9. If $\frac{3}{5}$ Ell cost $\frac{2}{3}$ of 19*s.* what cost 7 Ells?
Anfwer 7*l.* 7*s.* 9*d.* 1*qr.* $\frac{3}{9}$.

10. If 1*lb.* of Cochineal cost 1*l.* 5*s.* what will 36*lb.* $\frac{7}{10}$ come to? *Anfwer* 45*l.* 17*s.* 6*d.*

11. If

11. If 1 Yard Broad-Cloth cost 15s. $\frac{5}{8}$, what will 4 Pieces cost, each containing 27 Yards $\frac{3}{7}$? *Answer* 85l. 14s. 3d. $\frac{1}{4}\frac{40}{56}$.

12. Bought 3 Pieces $\frac{1}{2}$ of Silk, each containing 24 Ells $\frac{3}{8}$. at 6s 0d. $\frac{3}{4}$ *per* Ell, I desire to know what the whole Quantity cost? *Answer*, 25l. 17s. 2d. 1 qr. $\frac{15}{16}$.

The SINGLE RULE *of* THREE INVERSE,
In VULGAR FRACTIONS.

EXAMPLES.

1. IF 48 Men can build a Wall in 24 Days $\frac{1}{4}$, how many Men can do the same in 192 Days? *Ans.* 6. Men $\frac{48}{768}$.

2. If 25s. $\frac{2}{7}$ will pay for the Carriage of an *cwt.* 145 Miles $\frac{1}{4}$, how far may 6 *cwt.* $\frac{1}{2}$ be carried for the same Money? *Answer*, 22 *miles* $\frac{9}{26}$.

3. If 3 $\frac{1}{4}$ Yards of Cloth, that is 1 $\frac{1}{3}$ Yard wide, be sufficient to make a Cloke, how much must I have of that Sort, which is $\frac{4}{5}$ Yard wide, to make another of the same Bigness. *Answer* 4 $\frac{7}{8}$ *yds*.

4. If 3 Men can do a Piece of Work in 4 Hours $\frac{1}{2}$, in how many Hours will 10 Men do the same Work in?
Answer, 1 *hour* $\frac{7}{20}$.

5. If the Penny white Loaf weigh 7 oz. when a Bushel of Wheat cost 5s. 6d. what is the Bushel worth, when the Penny white Loaf weighs but 2 oz. $\frac{1}{2}$? *Answer*, 15s. $\frac{2}{5}$.

6. How many Yards of Canvass that is 1 Yard $\frac{1}{4}$ wide will be sufficient to line 20 Yards of Say that is $\frac{3}{4}$ Yard wide? *Answer*, 12 *Yards*.

The DOUBLE RULE *of* THREE,
in VULGAR FRACTIONS.

EXAMPLES.

1. IF a Carrier receives 2l. $\frac{1}{10}$ for the Carriage of 3 *cwt.* 150 Miles, how much ought he to receive for the Carriage of 7 *cwt.* 3 qrs. $\frac{1}{2}$, 50 Miles. *Ans.* 1l. 16s. 9d.

2. If 100l. in 12 Months gain 6l. Interest, what Principal will gain 3l. $\frac{3}{8}$ in 9 Months? *Answer* 75 l.

3. If 9 Students spend 10l $\frac{7}{9}$ in 18 Days, how much will 20 Students spend in 30 Days? 39l. 18s. 4d. $\frac{360}{1458}$.

4. A

4. A Man and his Wife having laboured 1 Day, earned $4s. \frac{5}{8}$. how much muſt they have for 10 Days $\frac{1}{2}$, when their two Sons help them ? *Anſ. 4l. 17s. 1d. $\frac{1}{2}$.*

5. If 50 *l.* in 5 Months gain $2l. \frac{17}{144}$. what Time will 13*l.* $\frac{1}{3}$ require to gain 1*l.* $\frac{1}{12}$? *Anſ. 9 Months.*

6. If the Carriage of 60 *cwt.* 20 Miles coſt $14l. \frac{1}{2}$, what Weight can I have carried 30 Miles for $5l. \frac{7}{16}$?

Anſwer. 15 *cwt.*

THE

THE
TUTOR's ASSISTANT.

PART III.

DECIMAL FRACTIONS.

IN Decimal Fractions the Integer or whole Thing, as one Pound, one Yard, one Gallon, &c. is supposed to be divided into ten equal Parts, and those Parts into Tenths, and so on without End.

So that the Denominator of a Decimal being always known to consist of an Unit, with as many Cyphers as the Numerator has Places, therefore is never set down, the Parts being only distinguished from whole Numbers, by a Comma prefixed; thus, ,5, which stands for $\frac{5}{10}$. ,25 for $\frac{25}{100}$. ,123 for $\frac{123}{1000}$.

But the different Value of Figures appears plainer by the following Table.

Whole Numbers.							Decimal Parts.						
7	6	5	4	3	2	1.	2	3	4	5	6	7
Millions.	C Thousands.	X Thousands.	Thousands.	Hundreds.	Tens.	Units.	Parts of Tens.	Parts of Hundreds.	Parts of Thousands.	Parts of X Thousands.	Parts of C Thousands.	Parts of Millions.

From which it plainly appears, that as whole Numbers increase in a ten-fold Proportion to the left Hand, so Decimal Parts decrease in a ten-fold Proportion to the right Hand, so that Cyphers placed before Decimal Parts decrease their Value, by removing them farther from the Comma, or Unit's Place; thus ,5 is 5 Parts of 10, or $\frac{5}{10}$. ,05 is 5 Parts of

100,

100, or $\frac{5}{10\bar{0}}$. ,005 is 5 Parts of 1000, or $\frac{5}{1000}$ 0005 is 5 Parts of 10000. or $\frac{5}{10000}$. But that Cyphers after Decimal Parts do not alter their Value. For ,5 ,50 ,500, &c. are each but $\frac{5}{10}$ of an Unit.

A FINITE DECIMAL is that which ends at a certain Number of Places, but an Infinite is that which no where ends.

A RECURRING DECIMAL is that wherein one or more Figures are continually repeated, as 2,75222.

And 52,275275275 is called a compound recurring Decimal.

Note. *A finite Decimal may be confidered as infinite, by making Cyphers to recur, for they do not alter the Value of the Decimal.*

In all Operations, if the Refult confifts of feveral Nines, reject them, and make the next fuperior Place an Unit more; thus, for 26, 5999 write 26,26.

In all circulating Numbers dafh the firft Figure; thus, 27,54222.

ADDITION *of* DECIMALS.

RULE. IN fetting down the propofed Numbers to be added, great Care muft be taken in placing every Figure directly underneath thofe of the fame Value, whether they be mixed Numbers, or pure Decimal Parts, and to perform which there muft be a due Regard had to the Comma's, or feparating Points, which ought always to ftand in a direct Line, one under another, and to the right Hand of them carefully place the Decimal Parts, according to their refpective Values, then add them as in whole Numbers.

EXAMPLES.

1. Add 72,5 + 32,071 + 2,1574 + 371,4 + 2,75. *Facit* 480,8784.

2. Add 50,007 + 2,0071 + 59,4 + 3207,1.

3. Add 3,5 + 47,25 + 927,01 + 2,0073 + 1,5.

4. Add 52,75 + ,4721 + 724 + 31,45 + 2,3075.

5. Add 3275 + 27,514 + 1,005, + ,725 + 7,32.

6. Add 27,5 + 52 + 3,2075 + ,7541 + 2710.

SUB-

SUBTRACTION of DECIMALS.

RULE. SUBTRACTION of Decimals, differs but little from whole Numbers, only in placing your Numbers, which muſt be carefully obſerved, as in Addition.

EXAMPLES.

1. From ,2754 take ,2371
2. From 2,37 take 1,76
3. From 271 take 215,7
4. From 270,2 take 75,4075

5. From 572 take 4,72
9. From 615 take 76,91
7. From 23,415 take ,37426
8. From ,107 take ,0007

MULTIPLICATION of DECIMALS.

RULE. PLACE the Factors, and multiply them as in whole Numbers, and from the Product towards the right Hand, cut off as many Places for Decimals as there are in both Factors together; But if there ſhould not be ſo many Places in the Product ſupply the Defect with Cyphers to the Left Hand.

EXAMPLES.

1. Multiply ,2365 by ,2435 *Facit* ,05758775
2. Multiply 2,071 by 2,27
3. Multiply 27,12 by 25,3
4. Multiply 79,347 by 2315
5. Multiply 2714 by ,3257
6. Multiply ,17105 by ,0237

7. Multiply 27,25 by 7,0071
8. Multiply 5,721 by ,0075
9. Multiply ,007 by 007
10. Multiply 2,015 by ,2705
11. Multiply ,0007 by ,0025

When any Number of Decimals is to be multiplied by 10, 100, 1000, &c. it is only removing the ſeparating Point in the Multiplicand, ſo many Places towards the Right Hand as there are Cyphers in the Multiplier, thus ,578 × 10 = 5,78 ,578 × 100 = 57,8 ,578 × 1000 = 578, ,578 × 10000 = 5780.

Contracted MULTIPLICATION of DECIMALS.

RULE. PUT the Units Place of the Multiplier under that Place of the Multiplicand that is intended to be kept in the Product; then invert the Order

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der of all the other Figures, *i. e.* write them all the contrary Way; then in multiplying, begin at that Figure in the Multiplicand which stands over the Figure you are then multiplying withal, and set down the first Figure of each particular Product, directly one under the other, and have a due Regard to the Increase arising from the Figures on the Right Hand of that Figure you begin to multiply at in the Multiplicand.

Note, *That in multiplying the Figure left out every Time next the right Hand in the Multiplicand, if the Product be* 5, *or upwards, to* 15 *carry* 1, *if* 15, *or upwards, to* 25 *carry* 2, *and if* 25, *or upwards, to* 35 *carry* 3, &c.

Examples.

1. Multiply 384,672158 by 36,8345 and let there be only 4 Places of Decimals in the Product, *Facit* 14166,2065

Contracted Way.	Common Way.
384,672158	384,672158
5438,63	36,8345
115401647	1923|360790
23080329	15386|38032
3077377	115401|6474
115402	3077377|264
15387	23080329|48
1923	115401647|4
14169,2065	14169,2066|038510

2. Multiply 3,141592 by 52,7438 and leave only 4 Places of Decimals. *Facit* 165,6995

3. Multiply 2,38645 by 8,2175, and leave only 4 Places of Decimals. *Facit* 19,6107

4. Multiply 375,13758 by 16,7324, and let there be only one Place of Decimals. *Facit* 6276,9

5. Multiply 375,13758 by 16,7324, and leave only 4 Places of Decimals. *Facit* 6276,9520

6. Multiply 395,3756 by ,75642, and let there be only 4 Places of Decimals. *Facit* 299,0099

DIVISION *of* DECIMALS.

THIS Rule is also worked as in whole Numbers, the only Difficulty is in valuing the Quotient, which is done by either of the following general Rules.

RULE 1. The first Figure in the Quotient is always of the same Value with that Figure of the Dividend, which answers or stands over the Place of Units in the Divisor.

2. The Quotient must always have so many Decimal Places, as the Dividend has more than the Divisor.

Note 1. *If the Divisor and Dividend have both the same Number of Decimal Parts, the Quotient will be all a whole Number.*

2. *If the Dividend hath not so many Places of Decimals as are in the Divisor, then so many Cyphers must be annexed to the Dividend, as will make them equal, and the Quotient will then be all an whole Number.*

3. *But if when the Division is done, the Quotient has not so many Figures as it should have Places of Decimals, then so many Cyphers must be prefixed as there are Places wanting.*

EXAMPLES.

1. Divide 85643,825 by 6,321 *Facit* 13549
2. Divide 48 by 144
3. Divide 217,75 by 65
4 Divide ,125 by ,0457
5. Divide ,709 by 2,574
6. Divide 5,714 by 8725
7. Divide 7382,54 by 6,4352
8. Divide ,08516438 by 423
9. Divide 267,15975 by 13,25
10. Divide 72,1564 by ,1347
11. Divide ,125 by ,0457

When Numbers are to be divided by 10, 100, 1000, 10000, &c, it is performed, by placing the separating Point in the Dividend so many Places towards the Left Hand, as there are Places in the Divisor.

thus, 5784 ÷ 10 = 578,4   5784 ÷ 1000 = 5,784
       5784 ÷ 100 = 57,84   5784 ÷ 10000 = ,5784

Contracted DIVISION *of* DECIMALS.

RULE. BY the first Rule, find what is the Value of the first Figure in the Quotient, then by knowing the first Figure's Denomination, the Decimal Places may be

L 2   re-

reduced to any Number, by taking as many of the Left Hand Figures of the Dividend as will answer them : And in dividing, omit one Figure of the Divisor at each following Operation.

Note, *That in multiplying every Figure left out in the Divisor, you must carry* 1, *if it be* 5, *or upwards, to* 15 ; *if* 15, *or upwards, to* 25 *carry* 2, *if* 25, *or upwards, to* 35 *carry* 3, &c.

E X A M P L E S.

1. Divide 721,17562 by 2,257432, and let there be only three Places of Decimals in the Quotient.

Contracted.
2,257432)721.17562(319,467
· · · · · 6772296
———
439460 ·
225743 ·
———
213717 · ·
203169 · ·

10548 · · ·
· 9030 · · ·
———
1518 · · · ·
1354 · · · ·

164 · · · · ·
158 · · · · ·

· 6

Common Way.
2,257432)721,17562(319,467
6772296|
———
439460|2
225743|2
———
213717|00
203168|88
———
· 10548|120
9029|728
———
1518|3920
1354|4592
———
163|93280
158|02024
———
· · 5|91256 ·

2. Divide 8,758615 by 5,2714167
3. Divide 5171,591 by 8,7586
4. Divide 25,1367 - by 217,35
5. Divide 514,7549 - by ,123425
6. Divide 70,23 - - by 7,9863
7. Divide 27,104 - by 3,712

R E-

REDUCTION *of* DECIMALS.

To reduce a Vulgar Fraction to a Decimal.

RULE. ADD Cyphers to the Numerator, and divide by the Denominator, the Quotient is the Decimal Fraction required.

EXAMPLES.

1. Reduce $\frac{1}{4}$ to a Decimal. 4)1,00(,25 *Facit*
2. Reduce $\frac{1}{2}$ to a Decimal. *Facit* ,5
3. Reduce $\frac{3}{4}$ to a Decimal. *Facit* ,75
4. Reduce $\frac{3}{8}$ to a Decimal. *Facit* ,375
5. Reduce $\frac{5}{26}$ to a Decimal. *Facit* ,1923076 $+$
6. Reduce $\frac{11}{4}$ of $\frac{10}{13}$ to a Decimal. *Facit* ,6043956 $+$

NOTE, *If the given Parts are of several Denominations, they may be reduced either by so many distinct Operations, as there are different Parts, or by first reducing them into their lowest Denomination, and then divide as before ; or,*

2dly, *Bring the lowest into Decimals of the next superior Denomination, and on the right Hand of the Decimal found, place the Parts given of the next superior Denomination, so proceeding till you bring out the Decimal Parts of the highest Integer required, by still dividing the Product by the next superior Denominator ; or,*

3dly, *To reduce Shillings, Pence, and Farthings ; if the Number of Shillings be even, take the Half for the first Place of Decimals, and let the second and third Places be filled up with the Farthings contained in the remaining Pence and Farthings, always remembring to add 1, when it is or exceeds 25 : But if the Number of Shillings be odd, the second Place of Decimals must be increased by 5.*

7. Reduce 5s. to the Decimal of a *l. Facit* ,25
8. Reduce 9s. to the Decimal of a *l. Facit* ,45
9. Reduce 16 s. to the Decimal of a *l. Facit* ,8
10. Reduce 8s. 4d. to the Decimal of a *l. Facit* 41 6

11. Reduce 16 s. 7d. $\frac{3}{4}$ to the Decimal of a *l. Facit* 832291 6

L 3 *first*

firſt.	*ſecond.*	*third.*

16 s. 7 d. $\frac{3}{4}$ 4)3,00   2)16   7$\frac{3}{4}$
12   4
_____   12)7,75   ,832   ___
199   32
4   2lo)16,64583

960)799(,832291*6*   ,832291*6*

12. Reduce 19s. 5d. $\frac{1}{2}$ to the Decimal of a *l. Facit* ,97291*6*

13. Reduce 12 Grains to the Decimal of a *lb.* Troy. *Facit* ,002081

14. Reduce 12 Drams to the Decimal of a *lb.* Avoirdupoiſe. *Facit* ,046875

15. Reduce 2 Quarters, 14 *lb.* to the Decimal of an *cwt. Facit* ,625

16. Reduce two Furlongs to the Decimal of a League. *Facit* ,083

17. Reduce 1 Pint to the Decimal of a Gallon. *Facit* ,125

18. Reduce 4 Gallons, 2 Quarts of Wine to the Decimal of a Hogſhead. *Facit* ,071428+

19. Reduce 2 Gallons, 1 Quart of Beer to the Decimal of a Barrel. *Facit* ,0625

20. Reduce 52 Days to the Decimal of a Year. *Facit* 142465+

To find the Value of any Decimal Fraction in the known Parts of an Integer.

RULE. Multiply the Decimal given by the Number of Parts of the next inferior Denomination, cutting off the Decimals from the Product; then multiply the Remainder by the next inferior Denomination, thus proceeding till you have brought it in the leaſt known Parts of the Integer.

Ex-

EXAMPLES.

1. What is the Value of ,832291.6 of a *l. Answ.* 16s. 7d. $\frac{1}{2}$. +

$$20$$

$$\overline{16,6458320}$$
$$12$$

$$\overline{7,7499840}$$
$$4$$

$$\overline{\frac{1}{2},9999360}$$

2. What is the Value of ,002084 of a *lb. Troy* ?
Answer, 12,00384 *qrs.*

3. What is the Value of ,046875 of a *lb.* Avoirdupoife ?
Answer, 12 *Drams.*

4. What is the Value of ,625 of an *cwt.* ? *Answer,* 2 *qrs.*
14 *lb.*

5. What is the Value of ,125 of a Gallon ? *Anf.* 1 *Pint.*

6. What is the Value of ,071428 of a Hogfhead of Wine ?
Answer, 4 *Gallons,* 1 *Quart,* ,999856.

7. What is the Value of ,0625 of a Barrel of Beer ?
Answer, 2 *Gallons,* 1 *Quart.*

8. What is the Value of ,142465 of a Year ?
Answer, 51,999725 *Days.*

TABLE I.
ENGLISH COIN.
1 L. the Integer.

Sh.	dec.	Sh.	dec.
19	,95	9	,45
18	,9	8	,4
17	,85	7	,35
16	,8	6	,3
15	,75	5	,25
14	,7	4	,2
13	,65	3	,15
12	,6	2	,1
11	,55	1	,05
10	,5		

Pence.	Decimals.
6	,025
5	,020833
4	,016666
3	,0125
2	,008333
1	,004166

Farth.	Decimals.
3	,003125
2	,0020833
1	,0010416

TABLE II.
Eng. Coin. 1 Sh.
Long Mea. 1 Foot,
The Integer.

Pence and Inch.	Decimals.
6	,5
5	,416666
4	,333333
3	,25
2	,166666
1	,083333

Farth.	Decimals.
3	,0625
2	,041666
1	,020 33

TABLE III.
TROY WEIGHT.
1 lb. the Integer.

Ounces the same as Pence in the last Table.

Penny-weight.	Decimals.
10	,041666
9	,0375
8	,033333
7	,029166
6	,025
5	,020833
4	,016666
3	,0125
2	,008333
1	,004166

Grains.	Decimals.
12	,002083
11	,001910
10	,001736
9	,001562
8	,001389
7	,001215
6	,001042
5	,000868
4	,000694
3	,000521
2	,000347
1	,000173

1 Oz. the Integer.
Pennywt. the same as Sh. in the first Table.

Grains.	Decimals.
12	,025
11	,022916
10	,020833
9	,01875
8	,016666
7	,014583
6	,0125
5	,010416
4	,008333
3	,00625
2	,004166
1	,002083

TABLE IV.
AVOIRDUP. WT.
112 lb. the Integer.

Qrs.	Decimals.
3	,75
2	,5
1	,25

Pounds.	Decimals.
14	,125
13	,116071
12	,107143
11	,098214
10	,089286
9	,080357
8	,071428
7	,0625
6	,053571
5	,044643
4	,035714
3	,026786
2	,017857
1	,008928

Ounces.	Decimals.
8	,004464
7	,003906

6	,003348
5	,002790
4	,002232
3	,001674
2	,001116
1	,000558

¼ Oz.	Decimals.
3	,000418
2	,000279
1	,000139

TABLE V.
AVOIRDUP. WT.
1 *lb.* the Integer.

Ounces.	Decimals.
8	,5
7	,4375
6	,375
5	,3125
4	,25
3	,1875
2	,125
1	,0625

Drams.	Decimals.
8	,03125
7	,027343
6	,023437
5	,019531
4	,015625
3	,011718
2	,007812
1	,003906

TABLE VI.
LIQUID MEAS.
1 Tun the Integer.

Gallons.	Decimals.
100	,396825
90	,357141

80	,317460
70	,27
60	,238095
50	,198412
40	,158730
30	,119047
20	,079365
10	,039682
9	,035714
8	,031746
7	,027
6	,023809
5	,019841
4	,015873
3	,011904
2	,007936
1	,003968

Pints.	Decimals.
4	,001984
3	,001488
2	,000992
1	,000496

A Hogshead the Integer.

Gallons.	Decimals.
30	,476190
20	,317460
10	,158730
9	,142857
8	,126984
7	,111111
6	,095238
5	,079365
4	,063492
3	,047619
2	,031746
1	,015873

Pints.	Decimals.
3	,005952
2	,003968
1	,001684

TABLE VII.
MEASURE.
Liquid. Dry.
1 Gallon. 1 Quarter.
Integer.

Pints.	decim.	Bush.
4	,5	4
3	,375	3
2	,25	2
1	,125	1

2 pts.	Decim.	Pec.
3	,09375	3
2	,0625	2
1	,03125	1

Decimals.	q. pks.
,0234375	3
,015625	2
,0078125	1

Decimals.	Pints.
,005859	3
,003906	2
,001953	1

TABLE VIII.
LONG MEASURE
1 Mile the Integer.

Yards.	Decimals.
1000	,568182
900	,511364
800	,454545
700	,397727
600	,340909

500	,284091	80	,219178	2	,001388
400	,227272	70	,191781	1	,000694
300	,170454	60	,164383		

TABLE X.
CLOTH MEASURE.
1 Yard the Integer
qrs. the same as
Table 4.

200	,113636	50	,136986
100	,056818	40	,109589
90	,051136	30	,082192
80	,045454	20	,054794
70	039773	10	,027397

Nails.	Decimals.
2	,125
1	,0625

60	,034091	9	,024657
50	,028409	8	,021918
40	,022727	7	,019178
30	,017045	6	,016438
20	,011364	5	,013698
10	,005682	4	,010959
9	,005114	3	,008219
8	,004545	2	,005479
7	,003977	1	,002739

TABLE II.
LEAD WEIGHT.
A Fother the Int.

Hund.	Decimals.
10	,512820
9	,461538
8	,410256
7	,358974
6	,307692
5	,256410
4	,205128
3	,153846
2	,102564
1	,051282

6	,003409
5	,002841
4	,002273
3	,001704
2	,001139
1	,000568

1 Day the Integer.

Hours.	Decimals.
12	,5
11	,458333
10	,416666
9	,375
8	,333333
7	,291666
6	,25
5	,208333
4	,166666
3	,125
2	,083333
1	,041666

qrs.	Decimals.
2	,025641
1	,012820

Feet.	Decimals.
2	,0003787
1	,0001894

Inch.	Decimals.
6	,000094
3	,0000474
1	,0000158

Pounds.	Decimals.
14	,0064102
13	,0059523
12	,0054945
11	,0050366
10	,0045787
9	,0041208
8	,0036630
7	,0032051
6	,0027472

TABLE IX.
TIME.
1 Year the Integ
Months the same
as Pence, in the
second Table.

Days	Decimals.	minutes.	Decimals.		
365	1,000000	30	,020833	6	,0027472
300	,821918	20	,013888	5	,0022893
200	,547945	10	,006944	4	,0018315
100	,273973	9	,00625	3	,0013736
90	,246575	8	,005555	2	,0009157
		7	,004861	1	,0004578
		6	,004166		
		5	,003472		
		4	,002777		
		3	,002083		

The RULE *of* THREE *in* Decimals.

EXAMPLES.

1. IF 26½ Yards cost 3*l*. 16*s*. 3*d*. what will 32 Yards and a Quarter come to ?

$$Yds. \quad l. \quad\quad Yds.$$
$$26,5 : 3,8125 :: 32,25 :$$
$$32,25$$

$$26,5)122,953125(4,63974 = 4l. \quad 12s. \quad 9d\tfrac{1}{2}.$$

2. What will the Pay of 540 Men come to at 1*l*. 5*s*. 6*d*. *per* Man. *Anfwer*, 688 *l*. 10*s*.

3. If 7 Yards, 3 Quarters of Cloth coft 2*l*. 12*s*. 9*d*. what will 140 Yards, one Half of the fame Cloth coft ?
Anfwer, 47*l*. 16*s*. 3*d*. 2,4 *qrs*.

4. If a Cheft of Sugar, weighing 7 *cwt*. 2 *qrs*. 14 *lb*. coft 36*l*. 12*s*. 9*d*. what will 2 *cwt*. 1 *qr*. 21 *lb*. of the fame Sugar coft ? *Anfwer*, 11*l*. 14*s*. 2*d*. 3,5 *qrs*.

5. A Grocer buys 24 Tun, 12 *cwt*. 2 *qrs*. 14 *lb*. 12 *oz*. of Tobacco for 3678 *l*. 6*s*. 4*d*. what will 1 *oz*. come to? *Anf*. 1*d*.

6. What will 326 *lb*. one Quarter of Tobacco come to, when 1 *lb*. ½ is fold for 3*s*. 6*d*. *Anfwer*, 38*l*. 1*s* 3*d*.

7. What is the Worth of 19 *oz*. 3 *dwt*. 5 *gr*. of Gold, at 2 *l*. 19*s*. *per oz*. ? *Anfw*. 56*l*. 10*s*. 5*d*. 2,298192 *qrs*.

8. What is the Worth of 827 Yards, 3 Quarters, of Painting, at 10*d*. ½ *per* Yard? *Anfw*. 36*l*. 4*s*. 3*d*. 1,5 *qr*.

9. If I lent my Friend 34*l*. for ⅝ of a Year, how much ought he to lend me $\frac{5}{12}$ of a Year to requite my Kindnefs ? *Anfwer*, 51*l*.

10. If ¾ of a Yard of Cloth, that is, 2 Yards one Quarter broad make a Garment, how much that is ⅘ of a Yard wide will make the fame ? *Anfwer*, 2,109375 *Yards*.

11. If 1 Ounce of Silver coft 5*s*. 6*d*. what is the Price of a Tankard that weighs 1 *lb*. 10 *oz*. 10 *dwt*. 4 *grains* ? *Anfwer*, 6*l*. 3*s*. 9*d*. 2,2 *grains*.

12. If 1 *lb*. of Tobacco coft 15*d*. what coft 3 Hogfheads, weighing together 15 *cwt*. 1 *qr*. 19 *lb*.? *Anfwer*, 107*l*. 18*s*. 9*d*.

13. If 1 *cwt*. of Currants coft 2*l*. 9*s*. 6*d*. what will 45 *cwt*. 3 *qrs*. 14 *lb*. coft at the fame Rate ?
Anfw. 113 *l*. 10*s*. 9*d*. 3 *qrs*.

14.

14. Bought 6 Chests of Sugar, each 6 *cwt.* 3 *qrs.* at 2*l.* 16*s. per cwt.* what do they come to ? *Answ.* 113 *l.* 8*s.*

15. Bought a Tankard for 10*l.* 12*s.* at the Rate of 5*s.* 4*d. per* Ounce, what was the Weight ? *Answer,* 39 *oz.* 15 *dwt.*

16. Gave 187*l.* 3*s.* 3*d.* for 25 *cwt.* 3 *qrs.* 14 *lb.* of To-bacco, at what Rate did I buy it at *per lb.* ?
Answer, 15*d.* 2 *qrs.*

17. Bought 29 *lb.* 4 *oz.* of Coffee for 10*l.* 11*s.* 3*d.* what is the Value of 3 *lb.* *Answ.* 1*l.* 1*s.* 8*d.*

18. If I gave 1*s.* 1*d* for 3 *lb.* ½ of Cheese, what will be the Value of 1 *cwt.* ? *Answ.* 1*l.* 14*s.* 8*d.*

EXTRACTION *of the* SQUARE ROOT.

EXtracting the Square Root is to find out such a Number as being multiplied into itself, the Product will be equal to the given Number.

RULE. *First*, Point the given Number, beginning at the Unit's Place, then to the Hundreds, and so upon every second Figure throughout.

Secondly, Seek the greatest Square Number in the first Point, towards the left Hand, placing the Square Number under the first Point, and the Root thereof in the Quotient ; subtract the Square Number from the first Point, and to the Remainder bring down the next Point, and call that the Resolvend.

Thirdly, Double the Quotient, and place it for a Divisor on the left Hand of the Resolvend ; seek how often the Divisor is contained in the Resolvend (reserving always the Unit's Place) and put the Answer in the Quotient, and also on the right Hand Side of the Divisor ; then multiply by the Figure last put in the Quotient, and subtract the Product from the Resolvend, bring down the next Point to the Remainder (if there be any more) and proceed as before.

ROOTS.	1.	2.	3.	4.	5.	6.	7.	8.	9.
SQUARES.	1.	4.	9.	16.	25.	36.	49.	64.	81.

EXAMPLES.

1. What is the Square Root of 4489? *Answer,* 67.

$$4489(67$$
$$36$$
$$\overline{}$$
$$127)\ .889$$
$$889$$
$$\overline{}$$

2. What is the Square Root of 106929? *Answ.* 327.
3. What is the Square Root of 2268741? *Ans.* 1506,23+
4. What is the Square Root of 7596796? *Ans.* 2756,228+
5. What is the Square Root of 36372961? *Ans.* 6031
6. What is the Square Root of 22071204? *Ans.* 4698

When the given Number confifts of a whole Number, and Decimals together, make the Number of Decimals even, by adding Cyphers to them, fo that there may be a Point fall on the Unit's Place of the whole Number.

7. What is the Square Root of 3271,4007? *Ans.* 57,19+
8. What is the Square Root of 4795,25731? *Ans.* 69,247+
9. What is the Square Root of 4,372594? *Ans.* 2,091+
10. What is the Square Root of 2,2710957? *Ans.* 1,50701+
11. What is the Square Root of ,00032754? *Ans.* ,01809+
12. What is the Square Root of 1,270054? *Ans.* 1,1269+

To *extract* the *Square Root* of a VULGAR FRACTION.

RULE. Reduce the Fraction to its loweft Terms, then extract the Square Root of the Numerator for a new Numerator, and the Square Root of the Denominator for a new Denominator.

If the Fraction be a Surd, (i. e.) *a Number where a Root can never be exactly found, reduce it to a Decimal, and extract the Root from it.*

EXAMPLES.

13. What is the Square Root of $\frac{2304}{5184}$? *Answ.* $\frac{2}{3}$.
14. What is the Square Root of $\frac{2704}{4225}$? *Answ.* $\frac{4}{5}$.
15. What is the Square Root of $\frac{9216}{12544}$. *Answ.* $\frac{6}{7}$.

M   SURDS.

SURDS.

16. What is the Square Root of $\frac{275}{341}$ *Answ.* ,89802$+$
17. What is the Square Root of $\frac{357}{476}$? *Answ.* ,86602$+$
18. What is the Square Root of $\frac{478}{549}$? *Answ.* ,93308$+$

To extract the Square Root of a MIXED NUMBER.

RULE. Reduce the Fractional Part of the mixed Number to its lowest Term, and then the mixed Number to an improper Fraction.

2*dly.* Extract the Roots of the Numerator and Denominator for a new Numerator and Denominator.

If the mixed Number given be a Surd, reduce the Fractional Part to a Decimal, annex it to the whole Number, and extract the Square Root therefrom.

EXAMPLES.

19. What is the Square Root of $51\frac{11}{25}$? *Answ.* $7\frac{1}{5}$.
20. What is the Square Root of $27\frac{9}{16}$? *Answ.* $5\frac{1}{4}$.
21. What is the Square Root of $9\frac{43}{49}$? *Answ.* $3\frac{1}{7}$.

SURDS.

22. What is the Square Root of $85\frac{14}{15}$? *Answ.* 9,27$+$
23. What is the Square Root of $8\frac{5}{7}$? *Answ.* 2,9519$+$
24. What is the Square Root of $6\frac{2}{5}$? *Answ.* 2,5298$+$

The APPLICATION.

1. There is an Army consisting of a certain Number of Men, who are placed Rank and File, that is, in the Form of a Square, each Side having 576 Men, I desire to know how many the whole Square contains? *Answ.* 331776.

2. A certain Pavement is made exactly square, each Side of which contains 97 Feet, I demand how many square Feet are contained therein? *Answ.* 9409.

To find a mean Proportional between any two given Numbers.

RULE. The Square Root of the Product of the given Numbers is the mean Proportional sought.

E x-

EXAMPLES.

1. What is the mean Proportional between 3 and 12?
Anſw. 3 × 12 = 36 then √36 = 6 *the mean Proportion.*

2. What is the mean Proportional between 4276, and 842? *Answer,* 1897,4+

To find the Side of a Square equal in Area to any given Superficies.

RULE. The Square Root of the Content of any given Superficies, is the Square equal ſought.

EXAMPLES.

3. If the Content of a given Circle be 160, what is the Side of the Square equal? *Anſw.* 12,64911.

4. If the Area of a Circle is 750, what is the Side of the Square equal? *Anſwer,* 27,38612.

The Area of a Circle given to find the Diameter.

RULE. As 355 : 452, or as 1 : 1.273239 : : ſo is the Area to the Square of the Diameter;——or, multiply the ſquare Root of the Area, by 1,12837. and the Product will be the Diameter.

EXAMPLE.

5. What Length of Cord will fit to tie to a Cow's Tail, the other End fixed in the Ground, to let her have Liberty of eating an Acre of Graſs, and no more, ſuppoſing the Cow and Tail to be 5 Yards and a Half. *Anſwer,* 6,136 *Perches.*

The Area of a Circle given to find the Periphery, or Circumference.

RULE. As 113 : 1420, or, as 1 : 12,56637 : : the Area to the Square of the Periphery, or multiply the Square Root of the Area by by 3,5449, and the Product is the Circumference.

EXAMPLES.

6. When the Area is 12, what is the Circumference? *Anſwer,* 12,2798.

7. When the Area is 160, what is the Periphery? *Anſwer,* 44,84.

Any two Sides of a right angled Triangle given to find the third Side,

1. *The Baſe and Perpendicular given to find the Hypothenuſe.*

M 2 RULE.

RULE. The Square Root of the Sum of the Squares of the Bafe and Perpendicular is the Length of the Hypothenufe.

EXAMPLE.

8. The Top of a Caftle from the Ground is 45 Yards high, and is furrounded with a Ditch 60 Yards broad, what Length muft a Ladder be to reach from the Outfide of the Ditch to the Top of the Caftle ? *Anfw.* 75 *Yards.*

Ditch.

Bafe 60 Yards.

45 Yards.
Heighth of the Caftle.
Perpendicular.
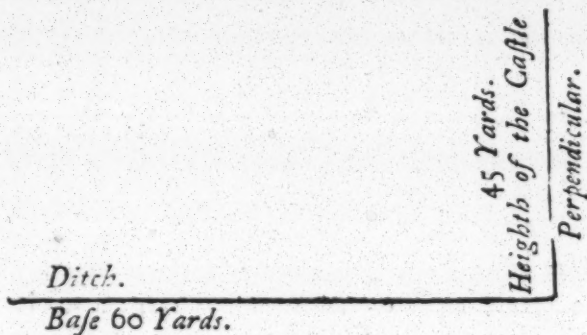
9. The Wall of a Town is 17 Feet high, which is furrounded by a Moat of 20 Feet in Breadth, I defire to know the Length of a Ladder that will reach from the Outfide of the Moat to the Top of the Wall ? *Anfw.* 26,2 *Feet.*

The Hypothenufe and Perpendicular given to find the Bafe.

RULE. The Square Root of the Difference of the Squares of the Hypothenufe and Perpendicular, is the Length of the Bafe.

The Bafe and Hypothenufe given to find the Perpendicular.

RULE. The Square Root of the Difference of the Squares of the Hypothenufe and Bafe is the Heighth of the Perpendicular.

N. B. *The two laft Queftions may be varied for Examples to the two laft Propofitions.*

Any Number of Men being given to form them into a fquare Battle, or to find the Number of Ranks and Files.

RULE. The Square Root of the Number of Men given, is the Number of Men either in Rank or File.

10. An Army confifting of 331776 Men, I defire to know how many in Rank and File ? *Anfwer,* 576.

11. An Army of 12544 Soldiers are to be put in Rank and File, I defire to know how many will be in the Front, and how many deep ? *Anfwer,* 112.

12. A

12. A certain square Pavement contains 197136 square Stones, all of the same Size, I demand how many are contained in one of the Sides? *Answer*, 444.

EXTRACTION *of the* CUBE ROOT.

TO extract the Cube Root it to find out a Number which being multiplied into itself, and then into that Product, produceth the given Number.

RULE. *First*, Point your given Number, beginning with the Unit's Place, and so on every third Figure to the left Hand.

Secondly, Seek the greatest Cube Number in the first Point towards the left Hand, putting the Root thereof in the Quotient, and the said Cube Number under the first Point, subtract it therefrom, and to the Remainder bring down the next Point, and call that the Resolvend.

Thirdly, Triple the Quotient, and place it under the Resolvend, the Units under the Tens Place of the Resolvend, and call this the triple Quotient.

Fourthly, Square the Quotient, and triple that Square, then place it under the triple Quotient, the Units under the Tens Place of the triple Quotient, and call this the triple Square.

Fifthly, Add these two together, in the Order they stand, and their Sum is the Divisor.

Sixthly, Seek how often the Divisor is contained in the Resolvend, rejecting the Unit's Place of the Resolvend, and put the Answer in the Quotient.

Seventhly, Cube the Figure last put in the Quotient, and put the Unit's Place of that under the Unit's Place of the Resolvend.

Eighthly, Multiply the Square of the last Figure in the Quotient into the triple Quotient, and place the Product under the last, one Place more to the left Hand.

Ninthly, Multiply the triple Square by the last Figure in the Quotient, and place it under the last, one Figure more to the left Hand.

Tenthly, Add the three last Lines together, and call that the Subtrahend.

Lastly, Subtract the Subtrahend from the Resolvend, and if there be another Point, bring it down to the Remainder, and call that a new Resolvend, and proceed in all Respects as before.

ROOTS. 1 . 2 . 3 . 4 . 5 . 6 . 7 . 8 . 9.
CUBES. 1 . 8 . 27. 64 . 125 . 216 . 343 . 512 . 729.

EXAMPLES.

1. What is the Cube Root of 314432 ? *Answer,* 68.

3¹4432(68
216
___

98432   *Resolvend.*
___

   18   *Triple Quotient of 6.*
 108   *Triple Square of the Quotient of 6*
___

1098   *Divisor.*
___

 512   *Cube of 8. last Figure of the Root.*
1152   *Square of 8 × by the triple Quotient.*
 864   *Triple Square of the Quotient 6 × by 8.*
___

98432   *Subtrahend.*

2. What is the Cube Root of 389017 ? *Anf.* 73.
3. What is the Cube Root of 5735339 ? *Anf.* 179.
4. What is the Cube Root of 32461759 ? *Anf.* 319.
5. What is the Cube Root of 84604519 ? *Anf.* 439.
6. What is the Cube Root of 259694072 ? *Anf.* 638.
7. What is the Cube Root of 48228544 ? *Anf.* 364.
8. What is the Cube Root of 27054036008 *Anf.* 3002.
9. What is the Cube Root of 22069810125 ? *Anf.* 2805.
10. What is the Cube Root of 122615327232 ? *Anf.* 4968.
11. What is the Cube Root of 219365327791 ? *Anf.* 6031.
12. What is the Cube·Root of 673373097125 ? *Anf.* 8765.

1. *When the given Number consists of a whole Number and Decimal together, make the Number of Decimals to consist of 3, 6, 9, &c. Places, by adding Cyphers thereto, so that there may be a Point fall on the Unit's Place of the whole Number.*

13. What

13. What is the Cube Root of 12,977875? *Ans.* 2,35.
14. What is the Cube Root of 36155,027576? *Ans.* 33,06 +
15. What is the Cube Root of ,001906624? *Ans.* ,124.
16. What is the Cube Root of 33,230979637? *Ans.* 3,215. +
17. What is the Cube Root of 15926,972504? *Ans.* 25,16. +
18. What is the Cube Root of ,053258279? *Ans.* ,376. +

To extract the Cube Root of a Vulgar Fraction.

RULE. Reduce the Fraction to its lowest Terms, then extract the Cube Root of the Numerator and Denominator for a new Numerator and Denominator, but if the Fraction be a Surd, reduce it to a Decimal, and then extract the Root from it.

EXAMPLES.

19. What is the Cube Root of $\frac{250}{686}$? *Ans.* $\frac{5}{7}$.
20. What is the Cube Root of $\frac{324}{1500}$? *Ans.* $\frac{3}{5}$.
21. What is the Cube Root of $\frac{1520}{5130}$? *Ans.* $\frac{2}{3}$.

SURDS.

22. What is the Cube Root of $\frac{4}{7}$? *Ans.* ,829 +
23. What is the Cube Root of $\frac{5}{9}$? *Ans.* ,822 +
24. What is the Cube Root of $\frac{2}{3}$? *Ans.* ,872 +

To extract the Cube Root of a mixt Number.

RULE. Reduce the fractional Part to its lowest Terms, and then the mixt Number to an improper Fraction, extract the Cube Roots of the Numerator and Denominator for a new Numerator and Denominator, but if the mixt Number given be a Surd, reduce the fractional Part to a Decimal, annex it to the whole Number, and extract the Root therefrom.

EXAMPLES.

25. What is the Cube Root of $12\frac{19}{27}$? *Ans.* $2\frac{1}{3}$.
26. What is the Cube Root of $31\frac{15}{343}$? *Ans.* $3\frac{1}{7}$.
27. What is the Cube Root of $405\frac{28}{125}$? *Ans.* $7\frac{2}{5}$.

SURDS.

28. What is the Cube Root of $7\frac{1}{5}$? *Ans.* 1,93 +
29. What is the Cube Root of $9\frac{1}{6}$? *Ans.* 2,092 +
30. What is the CubeRoot of $8\frac{4}{7}$? *Ans.* 2,056 +

The

The APPLICATION.

1. If a cubical Piece of Timber be 47 Inches long, 47 Inches broad, and 47 Inches deep, how many cubical Inches doth it contain ? *Anf.* 103823.

2. There is a Cellar dug, that is 12 Feet every Way in Length, Breadth, and Depth, how many folid Feet of Earth was taken out of it ? *Anf.* 1728.

3. There is a Stone of a Cubic Form, which contains 389017 folid Feet, what is the fuperficial Content of one of its Sides ? *Anf.* 5329.

Between two Numbers given, to find two mean Proportionals

RULE. Divide the greater Extream by the lefler, and the Cube Root of the Quotient multiplied by the lefler Extream, gives the lefler Mean; multiply the faid Cube Root by the lefler Mean, and the Product will be the greater Mean proportional.

EXAMPLES.

4. What are the two mean Proportionals between 6 and 162 ? *Anf.* 18 and 54.

5. What are the two mean Proportionals between 4 and 108 ? *Anf.* 12 and 36.

To find the Side of a Cube that fhall be equal in Solidity to any given Solid, as a Globe, Cylinder, Prifm, Cone, &c.

RULE. The Cube Root of the folid Content of any folid Body given, is the Side of the Cube of equal Solidity.

EXAMPLE.

6. If the folid Content of a Globe is 10648 what is the Side of a Cube of equal Solidity ? *Anf.* 22.

The Side of the Cube being given, to find the Side of that Cube, that fhall be double, treble,&c. in Quantity to the given Cube.

RULE. Cube the Side given, and multiply it by 2, 3, &c. the Cube Root of the Product is the Side fought.

EXAMPLE.

7. There is a cubical Veffel, whofe Side is 12 Inches, and it is equired to find the Side of another Veffel, that is to contain 3 Times as much ? *Anf.* 17,306.

EXTRACTION *of the* BIQUADRATE ROOT.

TO extract the Biquadrate Root, is to find out a Number, which being involved four Times into itself will produce the given Number.

RULE. First extract the Square Root of the given Number, and then extract the Square Root of that square Root, and it will give the Biquadrate Root required.

EXAMPLE.

1. What is the Biquadrate of 27 ? *Ans.* 531441.
2. What is the Biquadrate of 76 ? *Ans.* 33362176.
3. What is the Biquadrate of 275 ? *Ans.* 5719140625.
4. What is the Biquadrate Root of 531441 ? *Ans.* 27.
5. What is the Biquadrate Root of 33362176 ? *Ans.* 76.
6. What is the Biquadrate Root of 5719140625 ? *Ans.* 275.

A general RULE *for* EXTRACTING *the* ROOTS *of all* POWERS.

1. PREPARE the Number given for Extraction, by pointing off from the Units Place, as the Root required directs.

2. Find the first Figure in the Root ; by the Table of Powers, which subtract from the given Number.

3. Bring down the first Figure in the next Point to the Remainder, and call it the Dividend.

4. Involve the Root into the next inferior Power to that which is given, multiply it by the given Power, and call it the Divisor.

5. Find a Quotient Figure by common Division, and annex it to the Root, then involve the whole Root into the given Power, and call that the Subtrahend.

6. Subtract *that Number* from as many Points of the given Power as is brought down, beginning at the lowest Place, and to the Remainder bring down the first Figure of the next Point for a new Dividend.

7. Find a new Divisor, and proceed in all Respects as before.

E x.

EXAMPLES.

1. What is the square Root of 141376.

```
 . . .
141376(376
 9
```

6) 51   *Dividend*

   1369 *Subtrahend*

74)   447 *Dividend*

   141376 *Subtrahend*
```
 . .
```

$3 \times 2 = 6$ *Divisor*

$37 \times 37 = 1369$ *Subtrahend*

$37 \times 2 = 74$ *Divisor*

$376 \times 376 = 141376$ *Subtrahend*

2. What is the Cube Root of 53157376?

```
53157376(376?
27
```

27)261   *Dividend*

   50653 *Subtrahend*

4107)25043 *Dividend*

   53157376 *Subtrahend*

$3 \times 3 \times 3 = 27$ *Divisor*

$37 \times 37 \times 37 = 50653$ *Subtrahend*

$37 \times 37 \times 3 = 4107$ *Divisor*

$376 \times 376 \times 376 = 53157376$ *Subtrahend*

3. What

3. What is the Biquadrate Root of 19987173376?

$$19987173376(376$$
$$81$$

$$108)1188 \ Dividend$$

$$1874161 \ Subtrahend$$

$$202612)1245563 \ Dividend$$

$$19987173376 \ Subtrahend$$

$3 \times 3 \times 3 \times 4 = 108 \ Divisor$
$37 \times 37 \times 37 \times 37 = 184161 \ Subtrahend$
$37 \times 37 \times 37 \times 4 = 202612 \ Divisor$
$376 \times 376 \times 376 \times 376 = 19987173376 \ Subtrahend$

SIMPLE INTEREST.

THERE are five Letters to be observ'd in Simple Interest, *viz.*

> P. the Principal.
> T. the Time.
> R. the Ratio, or Rate *per Cent.*
> I. the Interest.
> A. the Amount.

A TABLE *of* RATIOS.

3	,03	5 ½	,055	8	,08
3 ½	,035	6	,06	8 ½	,085
4	,04	6 ½	,065	9	,09
4 ½	,045	7	,07	9 ½	,095
5	,05	7 ½	,075	10	,1

Note, *The* Ratio *is the Simple Interest of* 1 *l. for one Year, at the* Rate *per Cent., proposed, and is found thus :*

l.   *l.*   *l.*

As 100 : 3 : : 1 : ,03   *As* 100 : 3,5 : : 1 : ,035.

When

When the Principal, Time and Rate per Cent. *are given to find the Interest.*

RULE. Multiply the Principal, Time and Rate together, and it will give the Interest required.

Note. *The Proposition and Rule are more beautifully expressed thus :*

When *P T* and *R* are given to find *I.*

RULE. *prt = I.*

EXAMPLES.

1. What is the Interest of 945 *l.* 10*s.* for 3 Years, at 5 *per Cent. per Annum ? Answ.* 945,5 × ,05 × 3 = 141 ,825 *or* 141*l.* 16*s.* 6*d.*

2. What is the Interest of 547*l.* 14*s.* at 4 *per Cent. per Annum,* for 6 Years ? *Answ.* 131*l.* 1*s.* 11*d* 2 *qr.*

3. What is the Interest of 796*l.* 15*s.* at 4 ½ *per Cent. per Annum ?* for 5 Years ? *Answer,* 179*l.* 5*s.* 4*d.* 2 *qr.*

4. What is the Interest of 397*l.* 9*s.* 5*d.* for 2 Years and ½, at 3 ½ *per Cent. per Annum ? Answ.* 34*l.* 15*s.* 6*d.* 3 ,5497 *qrs.*

5. What is the Interest of 554*l.* 17*s.* 6*d.* for 3 Years, 8 Months, at 4 ½ *per Cent. per Annum ? Ans.* 91*l.* 11*s.* 1*d.*,05

6. What is the Interest 236*l.* 18*s.* 8*d.* for 3 Years, 8 Months, at 5 ½ *per Cent. per Annum ? Ans.* 47*l.* 15*s.* 7*d.* 2 ,2932 *qrs.*

When the Interest is for any Number of Days only.

RULE. Multiply the Interest of 1 *l.* for one Day, at the given Rate, by the Principal and Number of Days, it will give the Answer.

INTEREST *of* 1*l. for* 1 DAY.

per Cent.	Decimals.	per Cent.	Decimals.
3	,00008219178	6 ½	,00017808219
3 ½	,00009589041	7	,00019178082
4	,00010958904	7 ½	,00020547945
4 ½	,00012328767	8	,00021917808
5	,00013698630	8 ½	,00023287671
5 ½	,00015068493	9	,00024657534
6	,00016438356	9 ½	,00026027397

Note, *The above Table is thus found.*

As 365 : ,03 : : 1 : ,00008219178. *and As* 365 : ,035 : : 1 : ,00009589041, *&c.*

EXAMPLES.

1. What is the Interest of 240*l*, for 120 Days, at 4 *per Cent. per Annum?* Answer ,00010958904 × 240 × 120 = 3*l*. 3*s*. 1*d*. $\frac{1}{4}$.

2. What is the Interest of 563*l*. at 6 *per Cent. per Annum* for 126 Days? *Answ.* 11*l*. 13*s*. 2*d*. $\frac{1}{2}$.

3. What is the Interest of 560*l*. for 60 Days. at 5 *per Cent. per Annum?* Answ. 4*l*. 12*s* 0*d*. $\frac{1}{2}$.

4. What is the Interest of 364*l*. 18*s*. for 154 Days, at 5 *per Cent. per Annum?* Answ. 7*l*. 13*s*. 11*d*. $\frac{1}{4}$.

5. What is the Interest of 725*l*. 15*s*. for 74 Days, at 4 *per Cent. per Annum?* Answer, 5*l*. 17*s*. 8*d*. $\frac{1}{2}$.

6. What is the Interest of 100*l*. from the first of *June*, 1749, to the 9th of *March* following, at 5 *per Cent. per Annum?* Answer, 3*l*. 17*s*. 3*d*.

2, *When* P, R, T *are given to find* A.

RULE. *prt + p = A.*

EXAMPLES.

1. What will 279*l*. 12*s*. amount to in 7 Years, at 4$\frac{1}{2}$ *per Cent. per Annum?* Answer, 3,67*l*. 13*s*. 5*d*. 3,04 qrs. 279,6 × ,045 × 7 + 279,63 = 367,674.

2. What will 320 *l*. 17*s*. amount to in 5 Years, at 3$\frac{1}{2}$ *per Cent. per Annum?* Answer, 376*l*. 19*s*. 11*d*. 2,8 qrs.

3. What will 679*l*. 13*s*. amount to in 6 Years, at 5 *per Cent. per Annum?* Answer, 883*l*. 10*s*. 10*d*. 3,2 qrs.

When there is any odd Time given with the whole Years, reduce the odd Time into Days, and work with the Decimal Parts of a Year which are equal to those Days.

4. What will 926*l*. 12*s*. amount to in 5 Years $\frac{1}{2}$, at 4 *per per Cent. per Annum?* Answ. 1130*l*. 9*s*. 0*d*. 1,92 qrs.

5. What will 368*l*. 16*s*. amount to in 7 Years, $\frac{3}{4}$, at 6$\frac{1}{2}$ *per Cent. per Annum?* Answ. 554*l*. 11*s*. 7*d*. 3,68 qrs.

6. What will 273*l*. 18*s*. amount to in 4 Years, 175 Days, at at 3 *per Cent. per Annum?* Answ. 310*l*. 14*s*. 1*d*. 3,8872 qrs.

I. *When* A, R, T, *are given to find* P.

RULE. $\frac{a}{rt + 1,} = P.$

N

EXAMPLES.

1. What Principal being put to Interest, will amount to 367 *l*. 13*s*. 5*d*. 3,04 *qrs*. in 7 Years, at 4 ½ *per Cent. per Annum? Answer*, ,045×7+1=1,315, *then* 367, 674÷1 ,315 =279*l*. 12*s*.

2. What Principal being put to Interest, will amount to 376*l*. 19*s*. 11*d*. 2,8 in 5 Years, at 3 ½ *per Cent. per Annum? Answer*,320*l*. 17*s*.

3. What Principal being put to Interest will amount to 883*l*. 10*s*. 10*d*. 3,2 *qrs*. in 6 Years, at 5 *per Cent. per Annum? Answ*. 679*l*. 13*s*.

4. What Principal being put to Interest will amount to 1130*l*. 9*s*. 0*d*. 1,92 *qrs*. in 5 Years ½, at 4 *per Cent. per Annum? Answer*, 926*l*. 12*s*.

5. What Principal will amount to 554*l*. 11*s*. 7*d*. 3,68 *qrs*. in 7 Years ¼, at 6 ½ *per Cent. per Annum? Ans*. 368*l*. 16*s*.

6. What Principal will amount to 310 *l*. 14*s*. 1*d*. 3,8872 *qrs*. in 4 Years, 175 Days, at 3 *per Cent. per Annum? Answer*, 273*l*. 18*s*.

IV. *When* A, P, T *are given to find* R.

RULE. $\dfrac{a-p}{pt}=$ R.

EXAMPLES.

1. At what Rate *per Cent*. will 279*l*. 12*s*. amount to 367*l*. 13*s*. 5*d*. 3,04 *qrs*. in 7 Years.
Ans. 367,674—279,6=88,074. 279,6×7=1957,2 *then* 88,074÷1957,2=,045 *or* 4 ½ *per Cent*.

2. At what Rate *per Cent*. will 320*l*. 17*s*. amount to 376*l*. 19*s*. 11*d*. 2,8 *qrs*. in 5 Years? *Answ*. 3 ½ *per Cent*.

3. At what Rate *per Cent*. will 679*l*. 13*s*. amount to 883*l*. 10*s*. 10*d*. 3,2 *qrs*. in 6 Years? *Answ*. 5 *per Cent*.

4. At what Rate *per Cent*. will 926*l*. 12*s*. amount to 1130*l*. 9*s*. 0*d*. 1,92 *qrs*. in 5 Years ½? *Answ*. 4 *per Cent*.

5. At what Rate *per Cent*. will 368*l*. 16*s*. amount to 554*l*. 11*s*. 7*d*. 3,68 *qrs*. in 7 Years, ¼? *Answ*. 6 ½ *per Cent*.

6. At what Rate *per Cent*. will 273*l*. 18*s*. amount to 310*l*. 14*s*. 1*d*. 3,8872 *qrs*. in 4 Years, 175 Days? *Answ*. 3 *per Cent*.

V. *When* A, P, R *are given to find* T.

RULE. $\dfrac{a-p}{pr}=$ T.

1. In what Time will 279*l.* 12*s.* amount to 367*l.* 13*s.* 5*d.* 3,04 *qrs.* at 4 ½ *per Cent.* ? *Anf.* 367,674—279,6=88,074. 279,6×,045=12,5820 *then* 88,074÷12,5820= 7 *years.*

2. In what Time will 320*l.* 17*s.* amount to 376*l.* 19*s.* 11*d.* 2,8 *qrs.* at 3 ½ *per Cent.* ? *Anfw.* 5 *Years.*

3. In what Time will 679 *l.* 13*s.* amount to 883*l.* 10*s.* 10*d.* 3,2 *qrs.* at 5 *per Cent. per Annum* ? *Anfw.* 6 *Years.*

4. In what Time will 926*l.* 12*s.* amount to 1130*l.* 9*s.* 0*d.* 1,92 *qrs* at 4 *per Cent. per Annum?* *Anfw.* 5 *Years* ½.

5. In what Time will 368*l.* 16*s.* amount to 554*l.* 11*s.* 7*d.* 3,68 *qrs.* at 6 ½ *per Cent.* ? *Anfwer,* 7 *Years,* ¾.

6. In what Time will 273*l.* 18*s.* amount to 310*l.* 14*s.* 1*d.* 3,8872 *qrs.* at 3 *per Cent.* ? *Anfw.* 4 *Years,* 175 *Days.*

ANNUITIES, *or* PENSIONS, &c. *in* ARREARS.

Annuities, or Penfions, &c. are faid to be in Arrears, when they are payable or due, either yearly, half yearly, or quarterly, and are unpaid for any Number of Payments.

Note, U *reprefents the* Annuity, Penfion, *or* yearly Rent T, R, A, *as before,*

I. *When* U, R, T, *are given to find* A.

RULE. $\dfrac{ttu-tu}{2} \times r : + tu = $ A.

EXAMPLES.

1. If a Salary of 150*l.* be forborne 5 Years, at 5 *per Cent.* what would it amount to ? *Anfw.* 825*l.*

$$\overline{5 \times 5 \times 150} - \overline{5 \times 150} = 3000.\ then\ \frac{3000}{2} \times ,05 + 5 \times 150$$

=825*l.*

2. If 250*l.* yearly Penfion be forborne 7 Years, what will it amount to in that Time, at 6 *per Cent.* ? *Anfw.* 2065.

3. There is a Houfe let upon Leafe for 5 Years ½, at 60*l. per Annum,* what would be the Amount for the whole Time, at 4 ½ *per Cent* ? *Anf.* 363*l.* 8*s.* 3*d.*

4. Suppofe an annual Penfion of 28*l.* remains unpaid for 8 Years, what would it amount to at 5 *per Cent.* ? *Anfw.* 263*l.* 4*s.*

Note, *When the Annuities,* &c. *are to be paid half yearly, or quarterly, then*

For half-yearly Payments, *take Half of the Ratio, Half of the Annuity,* &c. *and twice the Number of Years*—and

For Quarterly Payments, *take a fourth Part of the Ratio, a fourth Part of the Annuity,* &c. *and four Times the Number of Years, and work as before.*

EXAMPLES.

5. If a Salary of 150*l.* payable every half Year, remains unpaid for 5 Years, what would it amount to in that Time, at 5 *per Cent. per Annum?* *Anſw.* 834*l.* 7*s.* 6*d.*

0. If a Salary of 150*l.* payable every Quarter were left unpaid for 5 Years, what would it amount to in that Time, at 5 *per Cent?* *Anſw.* 839*l.* 1*s.* 3*d.*

Note, *It may be obſerved by comparing theſe laſt Examples, that the Amount of the half yearly Payments are more advantageous than the yearly, and the Quarterly more than the half yearly.*

II. *When* A, R, T *are given to find* U.

RULE. $\dfrac{2a}{ttr - tr + 2t} = $ U.

EXAMPLES.

1. If a Salary amounted to 825*l.* in 5 Years, at 5 *per Cent.* what was the Salary ? *Anſ.* 150*l.*

$825 \times 2 = 1650.$ $\overline{5 \times 5 \times ,05 - 5 \times ,05 + 5 \times 2} = 11$ then $1650 \div 11 = 150\,l.$

2. If an Houſe be let upon Leaſe for 5 Years, $\frac{1}{2}$, and the Amount for that Time be 363*l.* 8*s.* 3*d.* at 4 $\frac{1}{2}$ *per Cent.* what is the yearly Rent ? *Anſ.* 60*l.*

3. If a Penſion amounted to 2065 *l.* in 7 Years, at 6 *per Cent.* what was the Penſion ? *Anſ.* 250 *l.*

4. Suppoſe the Amount of a Penſion be 263*l.* 4*s.* in 8 Years, at 5 *per Cent.* what is the Penſion ? *Anſ.* 28*l.*

Note. *When the Payments are half yearly, then take* 4a *and half of the Ratio, and twice the Number of Years, and if quarterly, then take* 8a, *one fourth of the Ratio, and four times the Number of Years, and proceed as before.*

5. If the Amount of a Salary payable half yearly, for 5 Years, and at 5 *per Cent.* be 834*l.* 7*s.* 6*d.* what is the Salary? *Anſ.* 150*l.*

6. If

6. If the Amount of an Annnuity payable quarterly be 839*l*. 1*s*. 3*d*. for 5 Years, at 5 *per Cent.* what is the Annuity ? *Anſ.* 150*l.*

III. *When* U, A, T *are given to find* R.

Rule. $\dfrac{2a - 2ut}{utt - ut} = $ R.

E X A M P L E S.

1. If a Salary of 150*l per. Annum*, amounts to 825*l*. in 5 Years, what is the Rate *per Cent* ? *Anſ.* 5 *per Cent.*

$$825 \times 2 - 150 \times 5 \times 2 = 150 \ then \ \frac{150.}{150 \times 5 \times 5 - 150 \times 5} = ,05$$

2. If an Houſe be let upon Leaſe for 5 Years $\frac{1}{2}$, at 60*l. per Annum*, and the Amount for that Time be 363*l*. 8*s*. 3*d*. what is the Rate *per Cent ? Anſ.* $4\frac{1}{2}$ *l. per Cent ?*

3. If a Penſion of 250*l. per Annum* amounts to 2065 in 7 Years, what is the Rate *per Cent ? Anſ.* 6*l. per Cent.*

4. Suppoſe the Amount of an yearly Penſion of 28*l*. be 263*l*. 4*s*. in 8 Years, what is the Rate *per Cent ? Anſ.* 5*l. per Cent.*

Note. *When the Payments are half-yearly,* it *muſt be* 4*a*—4ut, *and if quarterly,* 8a—8ut, *and work as before.*

5. If a Salary of 150*l. per Annum* payable half-yearly amounts to 834 *l*. 7*s*. 6*d*. in 5 Years, what is the Rate *per Cent ? Anſ.* 5 *per Cent.*

6. If an Annuity of 150 *l. per Annum* payable quarterly amounts to 39*l*. 1*s*. 3*d*. in 5 Years, what is the Rate *per Cent ? Anſ.* 5 *per Cent.*

IV. *When* U, A, R, *are given to find* T,

Rule. *Firſt* $\dfrac{2}{r} - 1 = x$ *then* $\sqrt{\dfrac{2a}{ur} + \dfrac{xx}{4}} : - \dfrac{x}{2} = $ T.

E X A M P L E S.

1. In what Time will a Salary of 150*l. per Annum,* amount to 825 *l*. at 5 *per Cent ? Anſ.* 5 *Years.*

N 3

$$\frac{2}{05} - 1 = 39\frac{825 \times 2}{150 \times ,05} = 220\frac{39 \times 39}{4} = 3880,05$$

$$\sqrt{220 + 380,25} = 24,5 - \frac{39}{2} = 5\ Years.$$

2. If an Houſe is let upon Leaſe for a certain Time for 60 *l. per Annum*, and the Amount be 363*l.* 8*s.* 3*d.* at 4½ *per Cent.* I deſire to know the Time it was let for ? *Anſ.* 5½ *Years.*

3. If a Penſion of 250 *l. per Annum* being forborne a certain Time, amounts to 2065*l.* at 6 *per Cent.* what was the Time of Forbearance ? *Anſ.* 7 *Years.*

4. In what Time will a yearly Penſion of 28*l.* amount to 263*l.* 4*s.* at 5 *per Cent* ? *Anſ.* 8 *Years.*

Note. *If the Payments are half yearly or quarterly, then* T *will be equal to thoſe half yearly or quarterly Payments.*

5. If an Annuity of 150 *per Annum*, payable half yearly amounts to 834*l.* 7*s.* 6*d.* at 5 *per Cent.* what Time was the Payment forborne ? *Anſ.* 5 *Years.*

6. If an yearly Penſion of 150 *l.* payable quarterly, amounts to 839*l.* 1*s.* 3*d.* at 5 *per Cent.* what was the Time of Forbearance ? *Anſ.* 5 *Years.*

PRESENT WORTH *of* ANNUITIES, &c.

NOTE, P *Repreſents the preſent Worth* U, T, R, *as before.*

I. *When* U, T, R, *are given to find* P.

RULE. $\dfrac{ttr - tr + 2t}{2tr + 2} : \times u = P.$

EXAMPLES.

1. What is the preſent Worth of 150*l. per Annum*, to continue 5 Years at 5 *per Cent* ? *Anſ.* 660*l.*

$5 \times 5 \times ,05 - 5 \times ,05 + 5 \times 2 = 11.5 \times ,05 \times 2 + 2. = 2,5$
then $11 \div 2,5 \times 150 = 660l.$

2. What is the yearly Rent of a Houſe of 60*l.* to continue 5½ Years worth in ready Money, at 4½ *per Cent* ? *Anſ.* 291*l.* 6*s.* 2*d.* 3,5 *qrs.*

3. What is the preſent Worth of 250*l. per Annum*, to continue 7 Years at 6 *per Cent* ? *Anſ.* 1454*l.* 4*s.* 6*d.*

4. What is a Penſion of 28*l. per Annum* worth in ready Money, at 5 *per Cent.* for 8 Years ? *Anſ.* 188 *l.*

Note. *The ſame Thing is to be obſerved here as in the firſt Rule of Annuities in Arrears, concerning half-yearly and quarterly Payments.*

5. What is the preſent Worth of 150*l.* payable half-yearly, for 5 Years, at 5 *per Cent?* *Anſ.* 667*l.* 10*s.*

6. What is the preſent Worth of 150*l.* payable quarterly for 5 Years, at 5 *per Cent?* *Anſ.* 671*l.* 5*s.*

Note. *By comparing the laſt Examples, it will be found, hat the preſent Worth of Half-yearly Payments is more advanagious thanYearly; and Quarterly, than Half-yearly.*

II. *When* P, T, R *are given to find* U.

RULE. $\dfrac{tr+1}{ttr-tr+2t} : \times 2p = $ U.

E X A M P L E S.

1. If the preſent Worth of a Salary be 660*l.* to continue 5 Years at 5 *per Cent.* what was the Salary? *Anſ.* 150 *l.*

$$5 \times ,05 + 1 = 1,25. \quad 5 \times 5 \times ,05 - 5 \times ,05 + 10 = 11$$

then $\dfrac{1,25}{11} \times 660 \times 2 = 150.$

2. There is an Houſe let upon Leaſe for 5½ Years to come, I deſire to know the yearly Rent, when the preſent Worth at 4½ *per Cent.* is 291*l.* 6*s.* 2*d.* 3,52 *qrs?* *Anſ.* 60*l.*

3. What Annuity is that which for 7 Years Continuance at 6 *per Cent.* produces 1454*l.* 4*s.* 6*d.* preſent Worth? *Anſ* 250.

4. What Annuity is that which for 8 Years Continuance, produces 188*l.* for the preſent Woith, at 5 *per Cent?* *Anſw.* 28*l.*

Note, *When the Payments are half-yearly, multiply by* 4p, *and when quarterly by* 8 p.

5. There is an Annuity payable half-yearly, for 5 Years to come, what is the yearly Rent, when the preſent Worth at 5 *per Cent.* is 667*l.* 10*s?* *Anſw.* 150*l.*

6. There is an Annuity payable quarterly, for 5 Years to come, I deſire to know the yearly Income, when the preſent Worth at 5 *per Cent.* is 671*l.* 5*s?* *Anſw.* 150.

III. *When* U, P, T *are given to find* R.

RULE. $\dfrac{ut-p \times 2}{2pt+ut-utt} = $ R.

E x-

E X A M P L E S.

1. At what Rate *per Cent.* will an Annuity of 150*l. per Annum*, to continue 5 Years, produce the prefent Worth of 660 *l ? Anfw.* 5 *per Cent.*

$$150 \times 5 - 600 \times 2 = 1800 \quad \overline{2 \times 660 \times 5} + \overline{150 \times 5 - 150 \times 5 \times 5} = 3600$$
then 180 ÷ 3600 = ,05 = 5 *per Cent.*

2. If an yearly Rent of 60*l. per Annum* to continue $5\frac{1}{2}$ Years, produces 291*l.* 6*s.* 2*d.* 3,52 qrs. for the prefent Worth, what is the Rate *per Cent ? Anfw.* $4\frac{1}{2}$ *per Cent.*

3. If an Annuity of 250*l. per Annum*, to continue 7 Years Produce, 1454*l.* 4*s.* 6*d.* for the prefent Worth, what is the Rate *per Cent ? Anfw.* 6 *per Cent.*

4. If a Penfion of 28*l. per Annum*, to continue 8 Years, produces 188*l.* for the prefent Worth, what is the Rate *per Cent ? Anfw.* 5 *per Cent.*

Note, *When the Annuities, or Rents, &c. are to be paid half-yearly, or quarterly, then*

For half yearly Payments *take half of the Annuity,* &c. *and twice the Number of Years, the Quotient will be the Ratio of half the Rate per* Cent. and

For quarterly Payments *take a fourth Part of the Annuity,* &c. *and four Times the Number of Years, the Quotient will be the Ratio of a fourth Part of the Rate per Cent.*

5. An Annuity of 150*l. per Annum*, payable half yearly, having 5 Years to come, is fold for 667*l.* 10*s.* what is the Rate *per Cent ? Anfw.* 5 *per Cent.*

6. If an Annuity of 150*l. per Annum*, payable quarterly, having 5 Years to come, be fold for 671*l.* 5*s.* what is the Rate *per Cent. ? Anfw.* 5 *per Cent.*

IV. *When* U, P, R *are given to find* T.

RULE. $\dfrac{2}{r} - \dfrac{2p}{u} - 1 = x$ *then* $\sqrt{\dfrac{2p}{ur}} + \dfrac{xx}{4} - \dfrac{x}{2} = $ T.

E X A M P L E S.

1. If an Annuity of 150*l. per Annum produce* 660*l.* for the prefent Worth, at 5 *per Cent.* what is the Time of its Continuance ? *Anfw.* 5 *Years.*

2

$$\frac{2}{,05} - \frac{600 \times 2}{150} - 1 = 30,1334 \qquad \frac{660 \times 2}{150 \times ,05} = 177,3333$$

$$30,1334 \times 30,1334 = 2270054 \text{ then } \sqrt{227,0054 + 177,3333} = 20,108$$
$$4$$

$$20,108 - \frac{30,134}{2} = 5 \text{ Years.}$$

2. For what Time may a Salary of 60*l.* be purchased for 291 *l.* 6*s.* 2*d.* 3,52 *qrs.* at 4½ *per Cent ? Anf.* 5½ *Year.*

3. For how long Time may 250 *per Annum* be purchased for 1454*l.* 4*s.* 6*d.* at 6 *per Cent ? Anf.* 7 *Years.*

4. What Time may a Penfion of 28*l. per Annum* be bought for 188*l.* at 5 *per Cent ? Anf.* 8 *Years.*

Note. *When the Payments are half-yearly, then* U *will be equal to half the Annuity,* &c. R *half the Ratio, and* T *the Number of Payments, and*

When the Payments are quarterly, U *will be equal to a fourth Part of the Annuity,* &c. R *the fourth of the* Ratio, *and* T *the Number of Payments.*

5. An Annuity of 150*l. per Annum,* payable half yearly, is fold for 667*l.* 10*s.* at 5 *per Cent.* I defire to know the Number of Payments, and the Time to come?

Anf. 10 *Payments,* 5 *Years.*

6. An Annuity of 150*l. per Annum* payable quarterly is fold for 671*l.* 5*s.* at 5 *per Cent.* what is the Number of Payments and Time to come? *Anf.* 20 *Payments,* 5 *Years.*

ANNUITIES &c. *taken in* REVERSION,

1. *To find the prefent Worth of an Annuity,* &c. *taken in Reverfion.*

RULE 1. Find the prefent Worth of the Yearly Sum at the given Rate, and for the Time of its Continuance,   *thus,*

$$\frac{ttr - tr + 2t}{2tr + 2} : \times u = P,$$

2. Change *P* into *A,* and find what Principal being put to Intereft will amount to *A,* at the fame Rate, and for the Time to come before the Annuity, &c. commences.   *thus,*

$$\frac{a}{tr + 1} = P.$$

E x

EXAMPLES.

1. What is the prefent Worth of an Annuity of 150 *l. per Annum*, to continue 5 Years, but not to commence till the End of 4 Years, allowing 5 *per Cent.* to the Purchafer ? *Anf.* 550.

$$\frac{5\times5\times,05-5\times,05+1\times5}{5\times,05\times2+2.} = 4,4\times150 = \frac{660}{4\times,05+1} = 550l.$$

2. What is the prefent Worth of a Leafe of 50*l. per Annum*, to continue 4 Years, but is not to commence till the End of 5 Years, allowing 4 *per Cent.* to the Purchafer? *An.* 152*l.* 5*s.* 11*d.* 3,04 *qrs.*

3. A Perfon having the Promife of a Penfion of 20*l. per Annum*, for 8 Years, but is not to commence till the End of 4 Years, is willing to difpofe of the fame for prefent Money at 5 *per ent.* what will be the prefent Worth? *Anf.* 111*l.* 18*s.* 1, 114+*d.*

4. A Legacy of 40*l.* being left for 6 Years to a Perfon of 15 Years of Age, but is not to commence till he is 21. He wanting Money, is defirous of felling the fame at 4 *per Cent.* what is the prefent Worth? *Anf.* 171*l.* 14*s.*

II. *To find the yearly Income of an Annnity,* &c. *in Reverfion.*

RULE 1. Find the Amount of the prefent Worth at the given Rate, and for the Time before the Reverfion, *thus,*

$$ptr + p = A.$$

2. Change A into P, and find what Annuity being fold will produce P. at the fame Rate, and for the Time of its Continuance, *thus,*

$$\frac{tr+1}{ttr-tr+2t} : \times 2p = U$$

EXAMPLES.

1. A. Perfon having an Annuity left him for 5 Years, which does not commence till the End of 4 Years, has difpofed of it for the prefent Payment of 550*l* allowing 5 *per Cent.* to the Purchafer, what is the yearly Income? *Anf.* 150 *l.*

$$550\times4\times,05+550 = 660 \frac{5\times,05+1}{5\times5\times,05-5\times,05+5\times2}$$

$$= ,113636\times660\times2 = 150l.$$

2. There

2. There is a Leafe of an Houfe taken for 4 Years, but not to commence till the End of 5 Years, the Lefiee would fell the fame for 152*l.* 5*s.* 11*d.* 3,04 *qrs.* prefent Payment, allowing 4 *per Cent.* to the Purchafer, what is the yearly Rent? *Anf.* 50*l.*

3. A Perfon having the Promife of a Penfion for 8 Years, which does not commence till the End of 4 Years, has difpofed of the fame for 111*l.* 18*s.* 1*d.* 114 prefent Money, allowing 5 *per Cent* to the Purchafer, what was the Penfion? *Anf.* 20*l.*

4. There is a certain Legacy left to a Perfon of 15 Years of Age, which is to be continued for 6 Years, but not to commence till he arrives to the Age of 21; he wanting a Sum of Money, fells it for 171*l.* 14*s.* allowing 5 *per Cent.* to the Buyer, what was the Annuity left him? *Anf.* 40.

REBATE *or* DISCOUNT.

Note, S Reprefents the Sum to be difcounted
      P the prefent Worth.
      T the Time.
      R the Ratio.

When S, T, R *are given to find* P.

RULE. $\dfrac{s}{tr+1}=P.$

EXAMPLES.

1. What is the prefent Worth of 357*l.* 10*s.* to be paid 9 Months hence, at 5 *per Cent? Anfw.* 344*l.* 11*s.* 6*d.* 2,88 *qrs.*

$$\frac{357,5}{,75\times,05+1}=344,578.$$

2. What is the prefent Worth of 275*l.* 10*s.* due for 7 Months hence, at 5 *per Cent? Anfwer,* 267*l.* 13*s.* 10*d.* ,152.

3. What is the prefent Worth of 875*l.* 5*s.* 6*d.* due 5 Months hence, at 4 ½ *per Cent? Anfw.* 859*l.* 3*s.* 3*d.* 3,168+*qrs.*

4. How much ready Money can I receive for a Note of 75*l.* due 15 Months hence, at 5 *per Cent? Anfw.* 70*l.* 11*s.* 9*d.* ,168.

II.

II. *When* P, T, R *are given to find* S.

RULE. $ptr + p = S.$

EXAMPLES.

1. If the prefent Worth of a Sum of Money due 9 Months hence, allowing 5 *per Cent.* to be 344*l.* 11*s.* 6*d.* 2,88 *qrs.* what was the Sum firft due ? *Anfw.* 357*l.* 10*s.*

$344,57808 \times ,75 \times ,07 + 344,57808 = 357l.$ 10*s.*

2. A Perfon owing a certain Sum payable 7 Months hence, agrees with the Creditor to pay him down 267*l.* 13*s.* 10*d.* ,152. allowing 5 *per Cent.* for prefent Payment, what is the Debt ? *Anfw.* 275*l.* 10*s.*

3. A Perfon receives 859*l.* 3*s.* 3*d.* 3,168 *qrs.* for a Sum of Money due 5 Months hence, allowing the Debtor $4\frac{1}{2}$ *per Cent.* for prefent Payment, what was the Sum due ? *Anfw.* 875*l.* 5*s.* 6*d*

4. A Perfon paid 70*l.* 11*s.* 9*d.* ,168 for a Debt due 15 Months hence, he being allowed 5 *per Cent.* for the Difcount, how much was the Debt ? *Anfw.* 75*l.*

III. *When* S, P, T *are given to find* R.

RULE. $\dfrac{s-p}{tp} = R$

EXAMPLES.

1. At what Rate *per Cent.* will 357*l.* 10*s.* payable 9 Months hence produce 344*l.* 11*s.* 6*d.* 2,88 *qrs.* for prefent Payment?

$$\frac{357,5 - 344,57808}{344,57808 \times ,75} = 05 = 5 \text{ per Cent.}$$

2. At what Rate *per Cent.* will 275*l.* 10*s.* payable 7 Months hence, produce 267*l.* 13*s.* 10*d* ,152 for prefent Payment? *Anfw.* 5 *per Cent.*

3. At what Rate *per Cent.* will 875*l.* 5*s.* payable 5 Months hence, produce the prefent Payment of 859*l.* 3*s.* 3*d.* 3,168 *qrs. Anfw.* $4\frac{1}{2}$ *per Cent.*

4. At what Rate *per Cent.* will 75*l.* payable 15 Months, hence produce the prefent Payment of 70*l.* 11*s.* 9*d.* ,168 ? *Anfw.* 5 *per Cent.*

IV. *When* S, P, R, *are given to find* T.

RULE. $\dfrac{s-p}{rp} = T.$

E x-.

E X A M P L E S.

1. The prefent Worth of 357*l*. 10*s*. due for a certain Time to come is 344*l*. 11*s*. 6*d*. 2,88 *qrs*. at 5 *per cent.* in what Time fhould the Sum have been paid without any Rebate?

$$Anfw. \frac{357,5 - 344,57808}{344,57808 \times ,05} = ,75 = 9 Months.$$

2. The prefent Worth of 275*l*. 10*s*. due for a certain Time to come, is 267*l*. 13*s*. 10*d*. ,152 at 5 *per Cent.* what Time fhould the Sum have been paid without any Rebate? *Anfwer,* 7 *Months.*

3. A Perfon receives 859*l*. 3*s*. 3*d*. 3,168 *qrs.* for 875*l*. 5*s*. due at a certain Time to come, allowing 4½ *per Cent.* Difcount; I defire to know in what Time the Debt fhould have been difcharged without any Rebate? *Anfwer,* 5 *Months.*

4. I have received 70*l*. 11*s*. 9*d*. ,168 for a Debt of 75*l*. allowing the Perfon 5 *per cent.* for prompt Payment, I defire to know when the Debt would have been payable without the Rebate? *Anfwer,* 15 *Months.*

E Q U A T I O N *of* P A Y M E N T S.

To find the true equated Time for the Payment of a Sum of Money due at feveral Times.

RULE. Find the prefent Worth of each Payment for its refpective Time, *thus* Add all the prefent Worths together, *then*

$$\frac{s}{tr+1} = P.$$
$$s - p = D.$$
and $\dfrac{d}{pr} = E.$

E X A M P L E S.

1. *A* owes *B* 200*l*. whereof 40*l*. is to be paid at 3 Months (60*l*. at 6 Months, and 100*l*. at 9 Months) at what Time may the whole Debt be paid together, Rebate being made at 5 *per cent.*? *Anfw.* $\dfrac{40}{1,0125} = 39,5061$

$$\frac{60}{1,025} = 58,5365 \qquad \frac{100}{1,0375} = 96,3855$$

then $200 - \overline{39,5061 + 58,5365 + 96,3855} = 5,5719$

$$\frac{5,5719}{194,4281 \times ,05} = ,57315 = 6 \, Months, \, 26 \, Days.$$

O

2. B

2. *B* owes *C* 800*l*. whereof 200*l*. is to be paid at 3 Months, 200*l*. at 4 Months, and 400*l*. at 6 Months ; but they agreeing to make but one Payment of the whole, at the Rate of 4 *per cent*. Rebate, the true equated Time is demanded ? *Anf.* 4 *Months*, 21 *Days*.

3. *A* owes *B* 1200*l*. which is to be paid as follows ; 200*l*. down, 500*l*. at the End of 10 Months, and the reft at the End of 20 Months ; but they agreeing to have but one Payment of the whole, Rebate at 3 *per cent*. the true equated Time is demanded ? *Anſw.* 1 *Year*, 11 *Days*.

COMPOUND INTEREST.

THE Letters made ufe of in Compound Intereft are,

A the Amount.
P the Principal.
T the Time.
R the Amount of 1*l*. for 1 Year, at any given Rate; which is thus found.

As 100 : 105 :: 1 : 1,05   *As* 100 : 105,5 :: 1 : 1,055

A TABLE of the Amounts of 1 *L*. for 1 Year.

Rates. per cent.	Amts. of 1 L.	Rates. per cent.	Amts. of 1 L.	Rates. per cent.	Amts. of 1 L.
3	1,03	5 $\frac{1}{2}$	1,055	8	1,08
3 $\frac{1}{2}$	1,035	6	1,06	8 $\frac{1}{2}$	1,085
4	1,04	6 $\frac{1}{2}$	1,095	9	1,09
4 $\frac{1}{2}$	1,045	7	1,07	9 $\frac{1}{2}$	1,095
5	1,05	7 $\frac{1}{2}$	1,075	10	1,1

A

A TABLE shewing the Amount of 1 Pound for any Number of Years under 31, at 5 and 6 *per Cent. per Annum?*

Years.	5 Rates.	6	Years.	5 Rates.	6
1	1,05000	1,06000	16	2,18287	2,54035
2	1,10250	1,12360	17	2,29201	2,69277
3	1,15762	1,19101	18	2,40662	2,85434
4	1,21550	1,26247	19	2,52695	3,02559
5	1,27628	1,33822	20	2,65329	3,20713
6	1,34009	1,41852	21	2,78596	3,89956
7	1,40710	1,50363	22	2,92526	3,60353
8	1,47745	1,59384	23	3,07152	3,81975
9	1,55132	1,68948	24	3,22510	4,04893
10	1,62889	1,79084	25	3,38635	4,29187
11	1,71034	1,89829	26	3,55567	4,54938
12	1,79585	2,01219	27	3,73345	4,82234
13	1,88565	2,13292	28	3,92013	5,11168
14	1,97993	2,26090	29	4,11613	5,41838
15	2,07892	2,39655	30	4,32194	5,74349

Note, *The above Table is thus made:* As 100 : 105 :: 1 : 1,05 *for first Year* ; *then,* As 100 : 105 :: 1,05 : 1,1025 2d *Year,* &c.

When P, T, R, *are given to find* A.

RULE. $p \times r^t = $ A.

EXAMPLES.

1. What will 225*l.* amount to in 3 Years Time, at, 5 *per cent. per Annum? Answer,* 1,05 × 1,05 × 1,05 = 1,157625 *then* 1,157625 × 225 = 260*l.* 9*s.* 3*d.* 3 *qrs.*

2. What will 200*l.* amount to in 4 Years, at 5 *per cent. per Annum? Answ.* 243*l.* 2,025 *s.*

3. What will 450*l.* amount to in 5 Years, at 4 *per cent. per Annum? Answ.* 547*l.* 9*s.* 10*d.* 2,0538368 *qrs.*

4. What will 500*l.* amount to in 4 Years, at 5½ *per cent. per Annum? Answer,* 619*l.* 8*s.* 2*d.* 3,8323 *qrs.*

II. *When* A, R, T, *are given to find* P.

RULE. $\dfrac{a}{rt} = $ P.

O 2

RULE.

RULE.

1. What Principal being put to Interest will amount to 260*l.* 9*s.* 3*d.* 3 *qrs.* in 3 Years, at 5 *per cent. per Annum* ? *Anſ.* 1,05 × 1,05 × 1,05 = 1,157625, *then,*

$$\frac{260,465625}{1,157625} = 225.$$

2. What Principal being put to Interest will amount to 243*l.* 2,025*s.* in 4 Years, at 5 *per cent. per Annum* ? *Anſ.* 200*l.*

3. What Principal will amount to 547*l.* 9*s.* 10*d* 2,0538368 *qrs.* in 5 Years, at 4 *per cent. per Annum* ? *Anſ.* 450*l.*

4. What Principal will amount to 619*l.* 8*s.* 2*d.* 3,8323 *qrs.* in 4 Years, at 5 ½ *per cent.* ? *Anſ.* 500*l.*

III. *When* P, A, T *are given to find* R.

RULE. $\frac{a}{p} = r^t$ *which being extracted by the Rules of Extraction, (the Time given in the Quotient ſhewing the Power) will give* R.

EXAMPLES.

1. At what Rate *per cent.* will 225 *l.* amount to 260*l.* 9*s.* 3*d.* 3 *qrs.* in 3 Years.?

Anſ. $\frac{260,565625}{225} = 1,157625.$ *the Cube Root of which* (*it being the third Power*) = 1,05 = 5 *per cent.*

2. At what Rate *per cent.* will 200*l.* amount to 243*l.* 2,025*s* in 4 Years ? *Anſ.* 5 *per cent.*

3. At what Rate *per cent.* will 450 *l.* amount to 547*l.* 9*s.* 10*d.* 2,0538368 *qrs.* in 5 Years ? *Anſ.* 4 *per cent.*

4. At what Rate *per cent.* will 500 *l.* amount to 619*l.* 8*s.* 2*d.* 3,8323 *qrs.* in 4 Years ? *Anſ.* 5 ½ *per cent.*

IV. *When* P, A, R *are given to find* T.

RULE. $\frac{a}{p} = r^t$ *which being continally divided by* r, *till nothing remains, the Number of thoſe Diviſions will be equal to* T.

Ex-

EXAMPLES.

1. In what Time will 225*l.* amount to 260*l.* 9*s.* 3*d.* 3 qrs.
at 5 *per cent.*? *Anf.* $\dfrac{260,465625}{225} = 1,157625$

then $\dfrac{1,157625}{1,05} = 1,1025$ $\dfrac{1,1025}{1,05} = 1,05$ $\dfrac{1,05}{1,05} = 1$ *the*

Number of Divifion being 3 = *Time fought.*

2. In what Time will 200*l.* amount to 243*l.* 2,025*s.* at
5 *per cent?* *Anf.* 4 *Years.*

3. In what Time will 450*l.* amount to 547*l.* 9*s.* 10*d.*
2,0538368 qrs. at 4 *per cent.*? *Anf.* 5 *Years.*

4. In what Time will 500*l.* amount to 619*l.* 8*s.* 2*d.* 3,8323
qrs. at 5 ½ *per cent.*? *Anf* 4 *Years.*

ANNUITIES *or* PENSIONS *in* ARREARS.

Note. U *reprefents the Annuity, Penfion, or yearly Rent,*
A, R, T, *as before.*

A TABLE fhewing the Amount of 1*l.* Annuity from
any Number of Years under 31, at 5 and 6 *per Cent.*
per Annum.

Years.	5 Rates.	6	Years.	5 Rates.	6
1	1,00000	1,00000	16	23,65749	25,67252
2	2,05000	2,06000	17	25,84036	28,21288
3	3,15250	3,18360	18	28,13238	30,90565
4	4,31012	4,37461	19	30,53900	33,75999
5	5,52563	5,63709	20	33,06595	36,78559
6	6,80191	6,97532	21	35,71925	39,99272
7	8,14200	8,39383	22	38,50521	43,39229
8	9,54910	9,89746	23	41,43047	46,99582
9	11,02656	11,49131	24	44,50199	50,81557
10	12,57789	13,18079	25	47,72709	54,86451
11	14,20678	14,97164	26	51,11345	59,15638
12	15,91712	16,86994	27	54,66912	63,70576
13	17,71298	18,88213	28	58,40258	68,52811
14	19,59863	21,01506	29	62,32271	73,63979
15	21,57856	23,27597	30	66,43884	79,05818

Note, *The above Table is made thus, take the firft Year's
Amount, which is* 1*l* *multiply it by* 1,05 + 1 = 2,05 = 2*d.*
Year's Amount, which alfo multiply by 1,05 + 1 = 3,1525
3*d Year's Amount,* &c.

1. *When* U, T, R *are given to find* A.

RULE. $\dfrac{ur^t - u}{r - 1} = $ A. *or by the Table thus,*

Multiply the Amount of 1*l.* for the Number of Years, and at the Rate *per cent.* given in the Question, by the Annuity, Pension, *&c.* and it will give the Answer.

EXAMPLES.

1. What will an Annuity of 50 *l. per Annum* payable yearly, amount to in 4 Years at 5 *per cent.*?
Ans. by the Rule 1,05 × 1,05 × 1,05 × 1,05 × 50 = 60,77531250

then $\dfrac{60,7753125 - 50}{1,05 - 1} = $ 215*l.* 10*s.* 1*d.* 2 *qrs.*

by the Table thus,
4,31012 × 50 = 215*l.* 10*s.* 1*d.* 1,16 *qrs.*

2. What will a Pension of 45 *l. per Annum* payable yearly amount to in 5 Years, at 5 *per cent.*?
Ans. 248*l.* 13*s.* 0*d.* 3,27 *qrs.*

3. If a Salary of 40*l. per Annum* to be paid yearly be forborne 6 Years, at 6 *per cent.* what is the Amount?
Ans. 279*l.* 0*s.* 3,072*d.*

4. If an Annuity of 75*l. per Annum* payable yearly be omitted to be paid for 10 Years, at 6 *per cent.* what is the Amount? *Ans.* 988*l.* 11*s.* 2,22*d.*

II. *When* U, T, R *are given to* find U.

RULE. $\dfrac{ar - a}{r^t - 1} = $ U.

EXAMPLES.

1. What Annuity being forborne 4 Years will amount 215*l.* 10*s.* 1*d.* 2 *qrs.* at 5 *per cent.*?
Ans. $\dfrac{215,50625 \times 1,05 - 215,50625}{1,05 \times 1,05 \times 1,05 \times 1,05 - 1} = $ 50*l.*

2. What Pension being forborne 5 Years will amount to 248*l.* 13*s.* 0*d.* 3,27 *qrs.* at 5 *per cent.*? *Ans.* 45*l.*

3. What Salary being omitted to be paid 6 Years, will amount to 279*l.* 0*s.* 3,072*d.* at 6 *per cent.* ? *Ans.* 40*l.*

4. If the Payment of an Annuity be forborne 10 Years, amount to 988*l.* 11*s.* 2,22*d.* at 6 *per cent.* what is the Annuity ? *Ans.* 75*l.*

III. *When* U, A, R *are given to find* T.

RULE. $\dfrac{ar+u-a}{u} = rt$ *which being continually divided by R, till nothing remains, the Number of those Divisions will be equal to* T.

E X A M P L E S.

1. In what Time will 50*l. per. Annum* amount to 215*l.* 10*s.* 1*d.* 2 *qrs.* at 5 *per* cent, for Non-Payment ?

Ans. $\dfrac{215,50625 \times 1,05 + 50 - 215,50625}{50} = 1,21550625$

which being continually divided by R, *the Number of those Divisions will be* $= 4$ *Years.*

2. In what Time will 45*l. per Annum* amount to 248*l.* 13*s.* 0*d.* 3,27 *qrs.* allowing 5 *per cent.* for Forbearance of Payment ? *Ans.* 5 *Years.*

3. In what Time will 40*l. per Annum* amount to 279*l.* 0*s.* 3,072*d.* at 6 *per cent. Ans.* 6 *Years.*

4. In what Time will 75 *l. per Annum* amount to 988*l.* 11*s.* 2,22*d.* allowing 6 *per cent.* for Forbearance of Payment ? *Ans.* 10 *Years.*

PRESENT WORTH *of* ANNUITIES, PENSIONS, *&c.*

A TABLE shewing the present Worth of 1*l.* Annuity for any Number of Years under 31, Rebate at 5 and 6 *per cent.*

Years.	5 Rates.	6	Years.	5 Rates.	6
1	0,95238	0,94336	16	10,83777	10,10589
2	1,85941	1,83339	17	11,27406	10,47726
3	2,72324	2,67301	18	11,68958	10,82760
4	3,54595	3,46510	19	12,08532	11,15811
5	4,32947	4,21236	20	12,46221	11,46992
6	5,07569	4,91732	21	12,82115	11,76407
7	5,78637	5,58238	22	13,16300	12,04158
8	6,46321	6,20979	23	13,48857	12,30338
9	7,10782	6,80169	24	13,79864	12,55035
10	7,72173	7,36008	25	14,09394	12,78335
11	8,30641	7,88687	26	14,37518	13,00316
12	8,86325	8,38384	27	14,64303	13,21053
13	9,39357	8,85268	28	14,89812	13,40616
14	9,89864	9,29498	29	15,14107	13,59072
15	10,37965	9,71225	30	15,37245	13,76483

Note, *The above Table is thus made, divide* 1*l.* *by* 1,05 = 95238 *the present Worth of the first Year, which* ÷ 1,05 = ,90703 *added to the first Year's present Worth* = 1,85941 *the second Year's present Worth, then,* 90703 ÷ 1,05 *and the Quotient added to* 1,85941 = 2,72324 *the third Year's present Worth,* &c.

I. *When* U, T, R *are given to find* P.

RULE. $$\frac{u - \frac{u}{r^t}}{r - 1} = P.$$ 			*or*

by the Table thus.

Multiply the present Worth of 1*l.* Annuity for the Time and Rate *per cent.* given, by the Annuity, Pension, *&c.* it will give the Answer.

EXAMPLES.

1. What is the present Worth of an Annuity of 30*l.* *per Annum*, to continue 7 Years, at 6 *per cent.*

Answ. $\dfrac{30}{1,50363} = 19,9517$ $30 - 19,9517 = 10,4083$

then $\dfrac{10,4083}{1,06-1} = 167l.$ 9*s.* 5,184*d.*

By the Table.
5,58238
30
——————
167,47140

2. What is the present Worth of a Pension of 40*l.* *per Annum*, to continue 8 Years, at 5 *per cent.* ? *Ans.* 258*l.* 10*s.* 6*d.* 3,264 *qrs.*

3. What is the present Worth of a Salary of 35*l.* to continue 7 Years, at 6 *per cent. Answ.* 195*l.* 7*s.* 7*d.* 3,968 *qrs.*

4. What is the yearly Rent of 20*l.* to continue 6 Years, worth in ready Money, at 5 *per cent.* ?
Ans. 101*l.* 10*s.* 3*d.* 1,248 *qrs.*

II. *When* P, T, R *are given to find* U.

RULE. $\dfrac{pr^t \times r - pr^t}{r^t - 1} = U.$

EXAMPLES.

1. If an Annuity be purchased for 167*l.* 9*s.* 5,184 *d.* to be continued 7 Years, at 6 *per cent.* what is the Annuity ?

Ans. $\dfrac{\overline{167,4716 \times 1,50363 \times 1,06} - \overline{167,4716 \times 1,50363}}{1,50363 - 1} = 30l.$

2. If the present Payment of 258*l.* 10*s.* 6*d.* 3,264 *qrs.* be made for a Salary 8 Years to come, at 5 *per cent.* what was the Salary ? *Answ.* 40*l.*

3. If the present Payment of 195*l.* 7*s.* 7*d.* 3,968 *qrs.* were required for a Pension for 7 Years to come, at 6 *per cent.* what is the Pension ? *Answ.* 35*l.*

4. If the present Worth of an Annuity 6 Years to come, be 101*l.* 10*s.* 3*d.* 1,248 *qrs.* at 5 *per cent.* what is that Annuity ? *Answ.* 20*l.*

III.

III. *When* U, P, R, *are given to find* T.

RULE. $\dfrac{u}{p+u-pr}=r^t$ *which being continually divided by* R, *till nothing remains, the Number of those Divisions will be equal to* T.

EXAMPLES.

1. How long may a Lease of 30*l.* yearly Rent be had for 167*l.* 9*s.* 5,184 *d.* allowing 6 *per cent.* to the Purchaser?

Ans. $\dfrac{30}{167,4716+30-177,5198}=1,50363$ *which being continually divided, the Number of those Divisions will be* $7=$ *to* T.

2. If 258*l.* 10*s.* 6*d.* 3,264 *qrs.* paid down for a Lease of 40*l. per Annum*, at 5 *per cent.* how long is the Lease purchased for? *Answ.* 8 *Years.*

3. If an House is let upon Lease for 35*l. per Annum*, and the Lessee makes present Payment of 195*l.* 7*s.* 8*d.* he being allowed 6 *per cent.* I demand how long the Lease is purchased for? *Answ.* 7 *Years.*

4. For what Time may a Lease of 26*l. per Annum*, be purchased, when present Payment is made of 101*l.* 10*s.* 3*d.* 2 *qrs* at 5 *per cent.*? *Answ.* 6 *Years.*

ANNUITIES, LEASES, &c. *taken in* REVERSION.

To find the present Worth of Annuities, Leases, &c. taken in Reversion.

RULE 1. Find the present Worth of the Annuity, *&c.* at the given Rate, and for the Time of its Continuance; *thus* change P into A, and find what Principal being put to Interest will amount to P at the same Rate, and for the Time to come, before the Annuity commences, which will be the present Worth of the Annuity, *&c.* *thus,*

$$\frac{u-\dfrac{u}{r^t}}{r-1}=P.$$

$$\frac{a}{r^t}=P.$$

EXAMPLES.

1. What is the prefent Worth of a Reverfion of a Leafe of 40 *l. per Annum*, to continue 6 Years, but not to commence till the End of 2 Years, allowing 6 *per cent.* to the Purchafer ? *Anfwer,* $\dfrac{40}{1,41852} = 28,198403$

$\dfrac{40-28,198403}{1,06-1} = 196,6932$ *then* $\dfrac{196,6932}{1,1236} = 175l.$ 1s. 1,488d.

2. What is the prefent Worth of a Reverfion of a Leafe of 60*l. per Annum*, to continue 7 Years, but not to commence till the End of 3 Years, allowing 5 *per cent.* to the Purchafer ? *Anfwer,* 299*l.* 18*s.* 2,4*d.*

3. There is a Leafe of a Houfe of 30*l. per Annum*, which is yet in being for 4 Years, and the Leffee is defirous to take a Leafe in Reverfion for 7 Years, to begin when the old Leafe fhall be expired, what will be the prefent Worth of the faid Leafe in Reverfion, allowing 5 *per cent.* to the Purchafer ? *Anfwer,* 142*l.* 16*s.* 3*d.* 2,688 *qrs.*

To find the yearly Income of an Annuity, &c. *taken in Reverfion.*

RULE. Find the Account of the prefent Worth, at the given Rate, and for the Time before the Annuity commences ; *thus,* $\qquad prt = A.$

Change A into P, and find what yearly Rent being fold, will produce P. at the fame Rate, and for the Time of its Continuance, which will be the yearly Sum required, *thus* $\qquad \dfrac{prt \times r - prt}{r^t - 1} = U.$

EXAMPLES.

1. What Annuity to be entered upon 2 Years hence, and then to continue 6 Years, may be purchafed for 175*l.* 1s. 1,488*d.* ready Money, at 5 *per cent.*

Anf.

Answ. 175,0562 × 1,1236 = 196,6932

then $\dfrac{196,6932 \times 1,41852 \times 1,06 - 279,03237}{1,41852 - 1} = 40l.$

2. The prefent Worth for a Leafe of an Houfe is 299*l.* 18*s.* 2,4*d.* taken in Reverfion for 7 Years, but not to commence till the End of 3 Years, allowing 5 *per cent.* to the Purchafer, what is the yearly Rent? *Anf.* 60 *l.*

3. There is a Leafe of an Houfe in Being for 4 Years, and the Leffee being minded to take a Leafe in Reverfion for 7 Years, to begin when the old Leafe fhall be expired, paid down 142*l.* 16*s.* 3*d.* 2,688 *qrs.* what was the yearly Rent of the Houfe, when the Leffee was allowed 5 *per cent.* for prefent Payment? *Anf.* 30*l.*

PURCHASING FREEHOLD *or* REAL ESTATES

Is fuch as is bought to continue for ever.

When U, R *are given to find* W.

RULE. $\dfrac{u}{r-1} = W.$

EXAMPLES.

1. What is the Worth of a Freehold Eftate of 50*l. per Annum,* allowing 5 *per cent.* to the Buyer?

Anf. $\dfrac{50}{1,05 - 1} = 1000l.$

2. What is an Eftate of 290*l. per Annum* to continue for ever worth in prefent Money, allowing 4 *per cent.* to the Buyer? *Anf.* 7250*l.*

2. If a Freehold Eftate of 75*l.* yearly Rent were to be fold, what is it worth, allowing the Buyer 6 *per cent.*? *Anf.* 1250*l.*

II. *When* W, R *are given to find* U.

RULE. $w \times \overline{r-1} = U.$

EXAMPLES.

1. If a Freehold Eftate is bought for 1000*l.* and the Allowance of 5 *per cent.* is made to the Buyer, what is the yearly Rent? *Anf.* 1,05 — 1 = ,05. *then* 1000 × ,05 = 50*l.*

2. If an Eftate be fold for 7250*l.* and 4 *per cent.* allowed to the Buyer, what is the yearly Rent? *Anf.* 290*l.*

3. If a Freehold Eftate is ·bought for 1250*l.* prefent Money, and an Allowance of 6 *per cent.* made to the Buyer for the fame, what is the yearly Rent ? *Anf.* 75*l.* ·

III. *When* W, U *are given to find* R.

Rule. $\dfrac{w+u}{w} = $ R.

Examples.

1. If an Eftate of 50 *l. per Annum* is bought for 1000*l.* what is the Rate *per cent.* ?

Anf. $\dfrac{1000+50}{1000} = 1,05 = 5$ *per Cent.*

2. If a Freehold Eftate of 290 *l. per Annum* be bought for 7250*l.* what was the Rate *per cent* allowed? *Anf.* 4 *per cent* ·

3. If an Eftate of 75*l. per Annum* is fold for 1250*l.* what is the Rate *per cent.* allowed ? *Anf.* 6 *per cent.*

Purchafing Freehold Estates *in* Reversion.

To find the Worth of a Freehold Eftate in Reverfion.

Rule. Find the Worth of the yearly Rent thus, $\dfrac{u}{r-1} = $ W.

Change W into A, and find what Principal being put to Intereft will amount to *A* at the fame Rate, and for the Time to come, before the Eftate commences, and that will be the Worth of the Eftate in Reverfion.   thus, $\dfrac{a}{rt} = $ P.

Examples.

1. If a Freehold Eftate of 50*l. per Annum,* to commence 4 Years hence, is to be fold, what is it worth, allowing the Purchafer 5 *per cent.* for prefent Payment ?

Anf. $\dfrac{50}{1,05-1} = 1000$, then $\dfrac{1000}{1,2155} = 822$*l.* 14*s.* 1*d.* 2 *qrs.* +

2. What is an Eftate of 200*l.* to continue for ever, but not to commence till the End of 2 Years, worth in ready Money, allowing the Purchafer 4 *per cent.*
Anf. 4622*l.* 15*s.* 7,44*d.*

P

3. What

3. What is an Eftate of 240*l. per Annum* worth in ready Money, to continue for ever, but not to commence till the End of 3 Years, Allowance being made at 6 *per cent.*
Anf. 3358*l.* 9*s.* 10*d* 2,24 *qrs.*

To find the yearly Rent of an Eftate taken in Reverfion.

RULE. Find the Amount of the Worth of the Eftate, at the given Rate and Time before it commences. $wrt - A$ *Thus,*

Change A into W, and find what yearly Rent being fold will produce W. at the fame Rate, *thus,* $\dfrac{wr \times r - wr}{r} = U$ which will be the yearly Rent required.

EXAMPLE.

1. If a Freehold Eftate, to commence 4 Years hence, is fold for 822*l.* 14*s.* 1*d.* 2 *qrs.* allowing the Purchafer 5 *per cent.* what is the yearly Income. *Anf.* $822{,}70625 \times 1{,}2155 = 1000.$

then $\dfrac{1000 \times 1{,}05 \times 1{,}05 - 1050}{1{,}05} = 50l.$

2. A Freehold Eftate is bought for 4622*l.* 15*s.* 7,44*d.* which does not commence till the End of 2 Years, the Buyer being allowed 4 *per cent.* for his Money, I defire to know the yearly Income ? *Anf.* 200*l.*

3. There is a certain Freehold Eftate fold for 3358*l.* 9*s.* 10*d.* 2,24 *qrs.* but not to commence till the Expiration of 3 Years, allowing 6 *per cent.* for prefent Payment, what is the yearly Income ? *Anf.* 240*l.*

RE-

REBATE or DISCOUNT.

A TABLE shewing the present Worth of 1l. due at any Number of Years to commence under 31 Rebate, at 5 and 6 per cent.

Years.	5 Rates.	6	Years.	5 Rates.	6
1	,952381	,943396	16	,458111	,393647
2	,907030	,889996	17	,436296	,371364
3	,863838	,839619	18	,415520	,350343
4	,822702	,792093	19	,395734	,330513
5	,783526	,747258	20	,376889	,311804
6	,746215	,704960	21	,358942	,294155
7	,710682	,665057	22	,341849	,277505
8	,676839	,627412	23	,325571	,261797
9	,644609	,591898	24	,310067	,246978
10	,613913	,558394	25	,295302	,232998
11	,584679	,526787	26	,281240	,219810
12	,556837	,496969	27	,267848	,207368
13	,530321	,468839	28	,255093	,195630
14	,505068	,442301	29	,242946	,184556
15	,481017	,417265	30	,231377	,174110

Note, *The above Table is made thus:* $1 \div 1,05 = ,952381$ *first Year's present Worth, and* $,952381 \div 1,05 = ,90703$ *second Year, and* $,90703 \div 1,05 = ,863838$ *third Year, &c.*

1. *When* S, T, R *are given to find* P.

RULE. $\frac{s}{rt} = P.$

EXAMPLES.

1. What is the present Worth of 315l. 12s. 4,2d. payable 4 Years hence at 6 per cent ? *Ans.* $1,06 \times 1,06 \times 1,06 \times 1,06 = 1,26247.$ *then*

$$\frac{315,6175}{1,26247} = 250.$$

by the Table.

$$\frac{315,6175}{,792093}$$
$$249,9984124275$$

P 2

2. If

2. If 344*l*. 14*s*. 9 *d*. 1,92 *qrs*. be payable in 7 Years Time, what is the prefent Worth, Rebate being made at 5 *per cent*. *Anf*. 245*l*.

3. There is a Debt of 441*l*. 17*s*. 3*d*. 192 *qrs*. which is payable 4 Years hence, but it is agreed to be paid in prefent Money, what Sum muft the Creditors receive, Rebate being made at 6 *per cent*. *Anf*. 350*l*.

II. *When* P, T, R *are given to find* S.

RULE. $p \times rt = $ S.

EXAMPLES.

1. If a Sum of Money due 4 Years hence produce 250*l*. for the prefent Payment, Rebate being made at 6 *per cent*. what was the Sum firft due?

Anf. 250×1,26247=315*l*. 12*s*. 4,2*d*.

2. If 245 *l*. be received for a Debt payable 7 Years hence, and an Allowance of 5 *per cent*. to the Debtor for prefent Payment, what was the Debt? *Anf*. 344*l*. 14*s*. 9*d*. 1,92 *qrs*.

3. There is a Sum of Money due at the Expiration of 4 Years, but the Creditor agrees to take 350*l*. for prefent Payment, allowing 6 *per cent*. what was the Debt?

Anf. 441*l*. 17*s*. 3*d*. 1,92 *qrs*.

III. *When* S, P, R *are given to find* T.

RULE. $\dfrac{s}{p} = r^t$ *which being continually divided by* R, *till nothing remains, the Number of thofe Divifions will be equal to* T.

EXAMPLES.

1 The prefent Payment of 250*l*. is made for a Debt of 315 *l*. 12*s*. 4,2*d*. Rebate at 6 *per cent*. in what Time was the Debt payable?

Anf. $\dfrac{315,6175}{250} = 1,26247$ *which being continually divided, thofe Divifions will equal to 4 = the Number of Years.*

2. A Perfon receives 245*l*. now for a Debt of 344*l*. 14*s*. 9*d*. 1,92 *qrs*. Rebate being made at 5 *per cent*. I demand in what Time the Debt was payable? *Anf*. 7 Years.

3. There is a Debt of 441*l*. 17*s*. 3*d*. 1,92 *qrs*. due at a certain Time to come, but 6 *per cent*. being allowed to the Debtor for the prefent Payment of 350*l*. I defire to know

in

in what Time the Sum fhould have been made without any Rebate ? *Anf.* 4 *Years.*

IV. *When* S, P, T *are given to find* R.

RULE. $\frac{s}{p} = rt.$ *which being extracted by the Rules of Extraction, (the Time given in the Queftion, fhewing the Power,) will be equal to* R.

EXAMPLES.

1. A Debt of 315*l.* 12*s.* 4*d.* 2 *qrs.* is due 4 Years hence, but it is agreed to take 250*l.* now, what is the Rate *per cent.* that the Rebate is made at ?

Anfw. $\frac{315,6175}{250} = 1,26247 : \sqrt{1,26247} = 1,06 = 6 \text{ per cent.}$

2. The prefent Worth of 344*l.* 14*s.* 9*d.* 1,92 *qrs.* payable 7 Years hence, is 245*l.* at what Rate *per cent.* is Rebate made ? *Anf.* 5 *per cent.*

3. There is a Debt of 441*l.* 17*s.* 3*d.* 1,92 *qrs.* payable in 4 Years Time, but it is agreed to take 350*l.* prefent Payment, I defire to know at what Rate *per cent.* Rebate is made at ? *Anf.* 6 *per cent.*

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PART IV.

DUODECIMALS:

Or what-is generally called *Cross Multiplication*, and *Squaring of Dimensions by Artificers and Workmen*.

RULES *for multiplying* DUODECIMALLY.

1, UNDER the Multiplicand write the corresponding Denominations of the Multiplier.

2. Multiply each Term in the Multiplicand (beginning at the lowest,) by the Feet in the Multiplier; write each Result under its respective Term, observing to carry an Unit for every 12, from each lower Denomination to its next Superior.

3. In the same Manner multiply the Multiplicand by the Primes in the Multiplier, and write the Result of each Term one Place more to the right Hand of those in the Multiplicand.

4. Work in the same Manner with the Seconds in the Multiplier, setting the Result of each Term two Places to the right Hand of those in the Multiplicand, and so on for Thirds, Fourths, &c.

EXAMPLES.

1. Multiply 7. 9 by 3. 6

by *Cross Multiplication*.

$$
\begin{array}{rl}
f.\ in. & f.\ in. \\
7.\ 9 \\
3.\ 6 \\
\hline
21 & =7\times3 \\
4.\ 6 & =9\times6 \\
3.\ 6 & =7\times6 \\
2.\ 3 & =9\times3 \\
\hline
27\ 1.6
\end{array}
$$

6 ½

By *Practice*.

$$
\begin{array}{rl}
7.\ 9 \\
3.\ 6 \\
\hline
23.\ 3 \\
3.\ 10\ 6 \\
\hline
27.\ 1.\ 6
\end{array}
$$

By

By *Duodecimals.*	*Decimals.*
7. 9	7,75
3. 6	3,5

By *Duodecimals.*				*Decimals.*
²3.	3.	× 3		3875
3.	10. 6	× 6		2325
27.	**1.**	**6**		**27,125**

	f.	*in.*		*f.*	*'*		*f.*	*'*	*"*
2. Multiply	8.	5.	by	4.	7.	*Facit*	38.	6.	11
3. Multiply	9.	8.	by	7.	6.	*Facit*	72.	6.	
4. Multiply	8.	1.	by	3.	5.	*Facit*	27.	7.	5
5. Multiply	7.	6.	by	5.	9.	*Facit*	43.	1.	6
6. Multiply	4.	7.	by	3.	10.	*Facit*	17.	6.	10
7. Multiply	7.	5. 9"	by	3.	5. 3".	*Facit*	25. 8.	6. 2	3
8. Multiply	10.	4. 5.	by	7. 8.	6.	*Facit*	79. 11.	0. 6.	6
9. Multiply	75.	7.	by	9.	8.	*Facit*	730.	7.	8.
10. Multiply	97.	8.	by	8.	9.	*Facit*	854.	7.	
11. Multiply	57.	9.	by	9.	5.	*Facit*	543.	9.	9
12. Multiply	75.	9.	by	17.	7.	*Facit*	1331.	11.	3
13. Multiply	87.	5.	by	35.	8.	*Facit*	3117.	10.	4
14. Multiply	179.	3.	by	38.	10.	*Facit*	6960.	10.	6
15. Multiply	259.	2.	by	48.	11.	*Facit*	12677	6	10
16. Multiply	257.	9.	by	39.	11.	*Facit*	10288.	6.	3
17. Multiply	311.	4. 7.	by	36	7. 5.	*Facit*	11402. 2.	4. 11.	11
18. Multiply	321.	7. 3.	by	9.	3. 6.	*Facit*	2988. 2.	10. 4.	6

The APPLICATION.

Artificers Works are computed by different Measures, *viz.*

1. *Glazing* and *Masons Flatwork* by the Foot.

2. *Painting, Plaistering, Paving,* &c. by the Yard.

3. *Partitioning, Flooring, Roofing, Tyling,* &c. by the Square of 100 Feet.

4. *Brickwork,* &c. by the Rod of 16 Feet$\frac{1}{2}$, whose Square is 272$\frac{1}{4}$.

MEASURING *by the* FOOT SQUARE, *as* GLAZIERS, *and* MASONS *Flatwork.*

EXAMPLES.

1. There is a House with three Tier of Windows, 3 in a Tier, the Height of the first Tier is 7 Feet 10 Inches, the

second 6 Feet 8 Inches, and the third 5 Feet 4 Inches, the Breadth of each is 3 Feet 11 Inches, what will the Glazing come to at 14*d. per* Foot.

Duodecimals.   233. 0. 6 *at* 14*d. per* Foot.

7.	10	*the*		
6.	8	*Heights*	2*d* $\frac{1}{6}$ 233.	=1*s.*
5.	4	*added.*	38. 10	=2*d.*
			$\frac{1}{2}$	=6 *Parts.*
19.	10			
	3	=*Windows.*	2|0)27|1. 10 $\frac{1}{2}$	
		in a Tier.	13. 11. 10 $\frac{1}{2}$	
59.	6			
	3	11. *Breadth.*		

178.	6	
54.	6	6

233.   0   6

2. What is the Worth of 8 Panes of Glass, each meafuring 4 Feet 10 Inches long, and 2 Feet 11 Inches broad, at 4*d.* $\frac{1}{8}$ *per* Foot? *Anfw.* 1*l.* 18*s.* 9*d.*

3. There are 8 Windows to be glaz'd, each meafures 1 Foot 6 Inches wide, and 3 Feet in Height, how much will they come to at 7*d.* $\frac{3}{4}$ *per* Foot? *Anf.* 1*l.* 3*s.* 3*d.*

4. What is the Price of a Marble Slab, whofe Length is 5 Feet 7 Inches, and Breadth 1 Foot 10 Inches, at 6*s. per* Foot? *Anfw.* 3*l.* 1*s.* 5*d.*

MEASURING *by the* YARD SQUARE, *as* PAVIORS, PAINTER, PLAISTERERS, *and* JOINERS.

Note, *Divide the Square Feet by* 9, *and it will give the Number of Square Yards.*

EXAMPLES.

5. A Room is to be cieled, whofe Length is 74 Feet 9 Inches, and Width 11 Feet 6 Inches, what will it come to at 3*s.* 10*d.* $\frac{1}{2}$ *per* Yard? *Anfw.* 18*l.* 10*s.* 0*d.* $\frac{3}{4}$.

6. What will the Paving of a Court-yard come to, at 4*d.* $\frac{3}{4}$ *per* Yard, the Length being 58 Feet 6 Inches, and Breadth 54 Feet 9 Inches? *Anfw.* 7*l.* 0*s.* 10*d.*

7. A Room painted 97 Feet 8 Inches about, and 9 Feet 10 Inches high, what does it come to at 2s. 8d. ¾ per Yard? *Answ.* 14l. 11s. 1d. ½.

8. What is the Content of a Piece of Wainscotting in Yards Square, that is 8 Feet 3 Inches long, and 6 Feet 6 Inches broad, and what will it come to at 6s. 7d. ½ per Yard? *Answ.* 1l. 19s. 5d ¼.

9. What will the Paving a Court-yard come to at 3s. 2d. *per* Yard, if the Length be 27 Feet 10 Inches, and the Breadth 14 Feet 9 Inches? *Answ.* 7l. 4s. 4d. ¾.

10. A Person has paved a Court-yard 42 Feet 9 Inches in Front, and 68 Feet 6 Inches in Depth, and in this he laid a Foot-way the Depth of the Court, of 5 Feet 6 Inches in Breadth: The Foot-way is laid with Purbeck Stone, at 3s. 6d. *per* Yard, and the rest with Pebbles, at 3s. *per* Yard, what will the Whole come to? *Answ.* 49l. 17s. 0d. ½.

11. What will the Plaistering a Ceiling, at 10d. *per* Yard, come to, supposing the Length 21 Feet 8 Inches, and the Breadth 14 Feet 10 Inches? *Answ.* 1l. 9s. 8d. ¾.

12. What will the Wainscotting a Room come to, at 6s. *per* Square Yard, supposing the Height of the Room, (taking in the Cornice and Mouldings) is 12 Feet 6 Inches, and the Compass 83 Feet 8 Inches, the Window Shutters each, 7 Feet 8 Inches by 3 Feet 6 Inches, and the Door 7 Feet by 3 Feet 6 Inches, the Shutters and Door, being work'd on both Sides, is reckon'd Work and half Work?
Answ. 36l. 12s. 2d. ½.

MEASURING *by the* SQUARE *of* 100 *Feet, as* FLOORING, PARTITIONING, ROOFING, TILING, *&c.*

EXAMPLES.

13. In 173 Feet, 10 Inches in Length, and 10 Feet 7 Inches in Height of Partitioning, how many Squares? *Answ.* 18 *Squares,* 39 F. 18 *In.* 10 p.

14. If a House of three Stories, besides the Ground Floor, was to be floored at 6l. 10s. *per* Square, and the House measures 20 Feet 8 Inches, by 16 Feet 9 Inches; there are 7 Fire Places, whose Measure are two of 6 Feet, by 4 Feet 6 Inches each, two of 6 Feet by 5 Feet 4 Inches each, and two of 5 Feet 8 Inches, by 4 Feet 8 Inches, and the seventh of 5 Feet 2 Inches, by 4 Feet, and the Well-hole for the Stairs is 10 Feet 6 Inches, by 8 Feet 9 Inches, what will the Whole come to? *Ans.* 53l. 13s. 3d. ¼.

15. If a House meafures within the Walls 52 Feet 8 Inches in Length, and 30 Feet 6 Inches in Breadth, and the Roof be of a true Pitch, what will it come to roofing, at 10s. 6d. per Square? *Anfw.* 12l. 12s. 11d. ¾.

Note, *In Tyling, Roofing, and Slating, it is cuftomary to reckon the Flat, and Half of any Building within the Wall, to be the Meafure of the Roof of that Building, when the faid Roof is of a true Pitch, i. e. when the Rafters are* ¾ *of the Breadth of the Building ; but if the Roof is more or lefs than the true Pitch, they meafure from one Side to the other, with a Rod or String.*

16. What will the Tyling of a Barn coft, at 25s. 6d. per Square, the Length being 43 Feet 10 Inches, and Breadth 27 Feet 5 Inches on the Flat, the eave Boards projecting 16 Inches on each Side? *Anfw.* 24l. 9s. 5d. ½.

MEASURING *by the* ROD.

Note, *Bricklayers always value their Work at the Rate of a Brick and a Half thick, and if the Thicknefs of the Wall is more or lefs, it muft be reduced to that Thicknefs by this*

RULE. Multiply the Area of the Wall by the Number of half Bricks the Thicknefs of the Wall is of ; the Product, divided by 3, gives the Area.

EXAMPLES.

17. If the Area of a Wall be 4085 Feet, and the Thicknefs two Bricks and a Half thick, how many Rods doth it contain? *Anfw.* 25.

18. If a Garden Wall be 254 Feet round, and 12 Feet 7 Inches high, and three Bricks thick, how many Rods doth it contain? *Anf.* 23 *Rods,* 178 *Feet.*

19. How many Square Rods are there in a Wall 62½ Feet long, 14 Feet 8 Inches high, and 2½ Bricks thick? *Anf.* 5 *Rods,* 167 *Feet.*

20. If the Side Walls of an Houfe be 28 Feet 10 Inches in Length, and the Heighth of the Roof from the Ground 53 Feet 8 Inches, and the Gable (or triangular Part at Top) to rife 42 Courfe of Bricks (reckoning 4 Courfe to a Foot.) Now, 20 Feet high is 2½ Bricks thick, 20 Feet more, at 2 Bricks thick, 15 Feet 8 Inches more, at 1½ Bricks thick, and the Gable at 1 Brick thick, what will the whole Work come to, at 5l. 16s. per Rod? *Anfw.* 48l. 13s. 5d. ¾.

Mul-

Multiplying several Figures by several, and the Product to be produced in one Line only.

RULE. Multiply the Units of the Multiplicand by the Units of the Multiplier, setting down the Units of the Product, and carry the Tens ; next multiply the Tens in the Multiplicand by the Units of the Multiplier, to which add the Product of the Units of the Multiplicand multiplied by the Tens in the Multiplier, and the Tens carried ; then multiply the Hundreds in the Multiplicand by the Units of the Multiplier, adding the Product of the Tens in the Multiplicand multiplied by the Tens in the Multiplier, and the Units of the Multiplicand by the Hundreds in the Multiplier ; and so proceed till you have multiplied the Multiplicand all through, by every Figure in the Multiplier.

EXAMPLE.

$$Multiply \quad 35234$$
$$by \quad 52424$$
$$\overline{1847107216}$$

$$35234$$
$$52424$$
$$\overline{\begin{array}{r} 140936 \\ 70468 \\ 140936 \\ 70468 \\ 176170 \end{array}}$$
$$\overline{1847107216}$$

EXPLANATION.

First, $4 \times 4 = 16$. that is, 6 and carry 1. *Secondly*, $3 \times 4 + 4 \times 2$, and 1 that was carried is 21. set down 1 and carry 2. *Thirdly*, $2 \times 4 + 3 \times 2 + 4 \times 4 + 2$ carried $= 32$, that is 2, and carry 3. *Fourthly*, $5 \times 4 + 2 \times 2 + 3 \times 4 + 4 \times 2 + 3$ carried $= 47$, set down 7 and carry 4. *Fifthly*, $3 \times 4 + 5 \times 2 + 2 \times 4 + 3 \times 2 + 4 + 5 + 4$ carried $= 60$, set down 0 and carry 6. *Sixthly*, $3 \times 2 + 5 \times 4 + 2 \times 2 + 3 \times 5 + 6$ carried $= 51$, set down 1 and carry 5. *Seventhly*, $3 \times 4 + 5 \times 2 + 2 \times 5 + 5$ carried $= 37$ that is 7 and carry 3. *Eighthly*, $3 \times 2 + 5 \times 5 + 3$ carried $= 34$, set down 4, and carry 3. *Lastly*, $3 \times 5 + 3$ carried $= 18$, which being multiplied by the last Figure in the Multiplier, set the whole down, and the Work is finished.

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PART V.

A Collection of QUESTIONS *set down promiscuously, for the greater Trial of the foregoing* RULES.

1. WRITE down two Millions, five hundred and two thousand, two hundred and five.

2. What is the Value of 14 Barrels of Soap, at 4*d.* ½ *per lb.* each Barrel containing 254 *lb*. *Answ.* 66*l.* 13*s.* 6*d.*

3. If 100*l.* Principal gain 5*l.* Interest in 12 Months, what Principal will gain 20*l.* in 8 Months ? *Anf.* 600*l.*

4. What Number is that from which, if the Square of 14 is deducted, and to the Remainder the Square of 12 be added, the Sum will be 250 ? *Anf.* 302.

5. *A* and *B* trade together ; *A* put in 320*l.* for 5 Months, and *B* 460*l.* for three Months, and they gained 100*l.* what must each Man receive ?

   Anf. A 53 *l.* 13*s.* 9*d.* $\frac{270}{298}$, *and* B 46*l.* 6*s.* 2*d.* $\frac{28}{298}$.

6. How many Yards of Cloth, at 17*s.* 6*d. per* Yard, can I have for 13 *cwt.* 2 *qrs.* of Wool, at 14*d. per lb* ?

   Anf. 100 *Yards* $\frac{158}{210}$.

7. What Number added to the Cube of 21, will make the Sum equal to 113 Times 147 ? *Anf.* 7350.

8. If I buy 1000 Ells of *Flemish* Linnen for 90*l.* what may I sell it at *per* Ell in *London,* to gain 10*l.* by the Whole ?

   Answ 3*s.* 4*d. per* Ell.

9. *A* has 648 Yards of Cloth, at 14*s. per* Yard, ready Money, but in Barter will have 16*s.* *B* has Wine at 42*l. per* Tun, ready Money, the Question is how much Wine must be given for the Cloth, and what is the Price of a Tun of Wine in Barter ? *Anf.* 48*l.* the Tun, *and* 10 Tun 3 Hogsheads, 12 Gallons of Wine must be given for the Cloth.

10. A Jeweller fold Jewels to the Value of 1200*l.* for which he received in Part 876 *French* Piftoles, at 16*s.* 6*d.* each, what Sum remains unpaid ? *Anfw.* 477*l.* 6*s.*

11. An Oilman bought 417 *cwt.* 1 *qr.* 15 *lb.* Grofs Weight, of Train Oil, Tare 20 *lb.* per 112 *lb.* how many neat Gallons were there, allowing 7½ *lb.* to a Gallon ? *Anfw.* 5119 *Gallons.*

12. Bought threefcore Pieces of Holland for three Times as many Pounds, and fold them again for four Times as much ; but if they had coft me as much as I fold them for, what fhould I have fold them for to gain after the fame Rate ? *Anfw.* 320*l.*

13. What Number taken from the Square of 54 will leave 19 Times 46 ? *Anfw.* 2042.

14. If I buy a Yard of Cloth for 14*s.* 6*d.* and fell it for 16*s.* 9*d.* what do I gain *per Cent* ? *Anf.* 15*l.* 10*s.* 4*d.* $\frac{74}{174}$.

15. Bought 27 Bags of Ginger, each weighing, Grofs 84 *lb.* ¾, Tare 1 *lb.* ⅜ per Bag, Trett, 4 *lb.* per 104 *lb.* what do they come to at 8*d.* ½ per *lb* ? *Anfw.* 76*l.* 13*s.* 2*d.* ¾.

16. If ² / ⁷ of an Ounce coft ⅞ of a Shilling, what will ⅚ *lb.* coft ? *Anfw.* 17*s.* 6*d.*

17. If ⅔ of a Gallon coft ⅗ of a *l.* what will ⅝ of a Tun coft ? *Anfw.* 105*l.*

18. A young Man received 210*l.* which was ⅔ of his elder Brother's Portion ; now three Times the elder Brother's Portion was half of the Father's Eftate, I demand how much the Eftate was ? *Anfw.* 1890*l.*

19. If the Salary of an Officer be 48,5*l.* per *Annum,* what muft he receive for 232 Days ? *Anfw.* 30*l.* 16*s.* 6*d.* 2 *qrs.*

20. A Gentleman fpends, one Day with another, 1*l.* 7*s.* 10*d.* ½, and at the Year's End layeth up 340*l.* what is his yearly Income ? *Anfw.* 848*l.* 14*s.* 4*d.* ½.

21. A Lady's Fortune confifted of a Cabinet, worth 200 *lb.* containing 16 Drawers, each having two Partitions, each of which contained 37 *l.* and 2 Crowns, pray what was her Portion ? *Anfw.* 1400*l.*

22. *A* has 13 Fother of Lead to fend abroad, each being 19 ½ Times 112 *lb.* *B* has 39 Cafks of Tin, each 388*lb.* how many Ounces Difference is there in the Weight of thefe Commodities ? *Anfw.* 12160.

23. A Captain and 160 Sailors took a Prize worth 1360*l.* of which the Captain had ⅕ for his Share, and the reft was equally divided among the Sailors, what was each Man's Part ? *Anfw. The Captain had* 272*l. and each Sailor* 6*l.* 16*s.*

24. What Number is that, to which if you add $7\frac{2}{3}$, the Whole will be $12\frac{1}{4}$? *Answ.* $4\frac{7}{12}$.

25. A certain Usurer put out $75l.$ for 12 Months, and received for Principal and Interest $81 l.$ I demand at what Rate *per Cent.* he received Interest ? *Answ.* $8l.$ *per Cent.*

26. What will $956l.$ amount to in $7\frac{1}{2}$ Years, at 5 *per Cent.* Simple Interest ? *Answ.* $1314l.$ $10s.$

27. At what Rate *per Cent.* will $956l.$ amount to $1314l.$ $10s.$ in $7\frac{1}{2}$ Years, at Simple Interest ? *Answ.* 5 *per Cent.*

28. If for $1l.$ $4s.$ I have $1200 lb.$ Weight carried 36 Miles, how many *lb.* Weight can I have carried 24 Miles for the same Money ? *Answ.* $1800 lb.$

29. If 8 Cannons in one Day spend 48 Barrels of Powder, I demand how many Barrels 24 Cannons will spend in 22 Days ? *Answ.* $3168.$

30. What Number is that, which being multiplied by $\frac{2}{3}$, will produce $\frac{1}{4}$? *Answ.* $\frac{3}{8}$.

31. *T* has 24 Cows worth $72s.$ each, and *B* 7 Horses worth $13l.$ apiece, how much will make good the Difference, in case they interchange their said Drove of Cattle ? *Answ.* $4l.$ $12s$

32. A Man dies and leaves $120l.$ to be given to 3 Persons, *viz. A, B* and *C* ; to *A* a Share unknown ; *B* twice as much as *A.* and *C* as much as *A* and *B*, what is the Share of each ? *Answ.* A $20l.$ B $40l.$ and C $60l.$

33. A Person dying left his Widow $1780l.$ and $1250l.$ to each of his 4 Children ; he had been $25\frac{1}{2}$ Years in Trade, and had cleared (at an Average) $126l.$ a Year, what had he to begin with ? *Answ.* $567l.$

34. There is the Sum of $1000l.$ to be divided among 3 Men, in such Manner, that if *A* has $3l.$ *B* shall have $5l.$ and *C* $8l.$ How much must each Man have ? *Answ.* A $187l.$ $10s.$ B $312l.$ $10s.$ *and* C $500l.$

35. A Piece of Wainscot is 8 Foot 6 Inches and $\frac{1}{2}$ long, and 2 Foot 9 Inches $\frac{3}{4}$ broad what is the Superficial Content ? *Answ.* 24 *Feet* $0'$ $3''$ 4. 6.

36. How many Changes may be rung on six Bells ? *Answ.* $720.$

37. A Merchant at *Amsterdam* is indebted to another in *London,* in $642l.$ and would pay it in *Spanish* Guilders, at $2s.$ *per* Piece, how many must the *English* Merchant receive ? *Answ.* $6420.$

38. If 360 Men be in Garrison, and have Provision for 6 Months; but hearing of no Relief at the End of 5 Months, how many Men muſt depart, that the Provisions may laſt ſo much longer? *Anſw.* 288.

39. The leſs of two Numbers is 187, their Difference 34, the Square of the Product is required? *Anſ.* 1707920929.

40. A Butcher ſends his Man with 216*l.* to a Fair to buy Cattle; Oxen at 11*l.* Cows at 40*s.* Colts at 1*l.* 5*s.* and Hogs at 1*l.* 15*s. per* Piece, and of each a like Number, how many of each Sort did he buy? *Anſw.* 13, *of each Sort, and* 8*l. over.*

41. What Number added to 11 $\frac{5}{7}$ will produce 36 $\frac{337}{616}$. *Anſw.* 24 $\frac{513}{6}$.

42. What Number multiplied by $\frac{3}{7}$ will produce 11 $\frac{9}{17}$. *Anſw.* 26 $\frac{46}{3}$.

43. A Man had 12 Sons, the youngeſt was three Years old, and the elder 58; they increaſed in Arithmetical Progreſſion, what was the common Difference of their Ages? *Anſw.* 5 *Years.*

44. What is the Value of 179 Hogſheads of Tobacco, each weighing 13 *cwt.* at 2*l.* 7*s.* 1*d. per cwt?* *Anſ.* 5478*l.* 2*s.* 11*d.*

45. My Factor ſends me Word he has bought Goods to the Value of 500*l.* 13*s.* 6*d.* upon my Account, what will his Commiſſion come to at 3 $\frac{1}{2}$ *per Cent.* *Anſw.* 17*l.* 10*s.* 5*d.* 2 *qrs.* $\frac{68}{100}$.

46. Miſs *Kitty* told her Siſter *Charlotte,* whoſe Father had before left them twelve thouſand twelve hundred Pounds apiece; that their Grandmother by Will had raiſed her Fortune to fifteen thouſand Pounds, and had made her own twenty thouſand, what did the old Lady leave between them? *Anſw.* 8600*l.*

47. A Snail in getting up a May-pole, only 20 Feet high, was obſerved to climb 8 Feet every Day, but every Night he came down again 4 Feet; in what Time, by this Method, did he reach the Top of the Pole? *Anſ.* 4 *Days.*

48. If the $\frac{1}{3}$ of 6 be 3, what will the $\frac{1}{4}$ of 20 be? *Anſ.* 7 $\frac{1}{2}$.

49. What is the Difference between 14676, and the Fourth of itſelf? *Anſw.* 11007.

50. There is in 3 Bags the Sum of 1468*l. viz.* in the firſt Bag 461*l.* in the ſecond 581*l.* what was in the third Bag? *Anſw.* 426*l.*

51. What is the Decimal of 3 *qrs.* 14 *lb.* of an *cwt?* *Anſw.* ,875

52. How many *lbs.* of Sugar, at 4 *l.* $\frac{1}{2}$ *per lb.* muſt be given in Barter for 60 Groſs of Incle, at 8*s.* 8*d. per* Groſs? *Anſw.* 1386 $\frac{2}{3}$.

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53. If I buy Yarn for 9*d.* the *lb.* and fell it again for 13*d.* ½ *per lb.* what is the Gain *per Cent ? Anſw.* 50*l.*

54. A Tobacconiſt would mix 20 *lb.* of Tobacco, at 9*d. per lb.* with 60*lb.* at 12*d. per lb.* 40*lb.* at 18*d.* the *lb.* and with 12 *lb.* at 2*s. per lb.* what is a *lb.* of this Mixture worth ? *Anſw.* 1*s.* 2*d.* ½, *nearly.*

55. What is the Value of 14 Barrels of Soap, at 4*d.* ½ *per lb.* each Barrel, containing 254 *lb ? Anſw.* 66*l.* 13*s.* 6*d.*

56. Two Perſons, *A* and *B*, owe ſeveral Debts ; the leſſer Debt being that of *A,* is 2173*l.* the Difference is 371*l.* what is the Debt of *B ? Anſw.* 2544*l.*

57. What is the Difference between twice eight and twenty, and twice twenty eight : As alſo, between twice five and fifty, and twice fifty five ? *Anſw.* 20.   50.

58. What Number taken from the Square of 54 will leave 19 Times 46 ? *Anſw.* 2042.

59. A School-maſter being aſked how many Scholars he had, ſaid, If I had as many, half as many, and 1 Quarter as many, I ſhould have 99, how many had he ? *Anſ.* 36.

60. An ancient Lady being aſked how old ſhe was, to avoid a direct Anſwer, ſaid, I have 9 Children and there are 3 Years between the Birth of each of them, the Eldeſt was born when I was 19 Years old, which is now exactly the Age of the youngeſt, how old was the Lady ? *Anſ.* 62 *Years old.*

61. What Number is that which being added to 168 makes the Sum to be 706 ? *Anſ.* 538.

62. From 100*l.* borrowed take 72 paid,
'Twas a Virgin that lent it, what's due to the Maid ?
Anſ. 28*l.*

63. If when Wheat is 4*s. per* Buſhel, the 20 Penny Loaf weighs 18*lb.* what muſt the ſaid 20 Penny Loaf weigh, when Wheat is 6*s.* the Buſhel ? *Anſ.* 12*lb.*

64. Whereas a Noble and a Mark juſt 15 Yards did buy,
How many Ells of the ſame Cloth for 50 *l.* had I?
Anſ. 600.

65. A Broker bought for his Principal in the Year 1720, 400*l.* Capital Stock in the South Sea at 650 *per cent.* and ſold it again when it was worth but 130 *per cent.* how much was loſt in the whole ? *Anſ.* 2080*l.*

66. What Number added to the 43*d.* part of 4429 will make the Sum 240 ? *Anſ.* 137.

67. What Number deducted from the 26th Part of 2262 will leave the 87th Part of the ſame ? *Anſ.* 61.

68. A Gentleman went to Sea at 17 Years of 'Age, 8 Years after that he had a Son born who lived 46 Years, and died before his Father, after whom the Father lived twice 20 years, and then died also, what was the Age of the Father when he died ? *Anf.* 111 *Years.*

69. C hath Candles at 6s. *per* Dozen ready Money, but in Barter will have 6s. 6d. *per* Dozen, D hath Cotton at 9d. *per lb.* ready Money, I demand what Price the Cotton muft be at in Barter, alfo how much Cotton muft be bartered for 100 Dozen of Candles ? *Anf. the Cotton* 9d. 3 *qrs. per lb. and* 1 cwt. 0 *qrs.* 16 lb. *of Cotton muft be given for* 100 *Dozen of Candles.*

70. The Sum of two Numbers is 360, the lefs is 114, what is their Difference, Product and larger Quote ? *Anf.* 132 *Diff.* 28044 *Product,* 2 $\frac{3}{19}$ *Quote.*

71. A Brigade of Horfe confifting of 384 Men is to be formed into a Square Body, having 32 Men in Front, how many Ranks will there be ? *Anf.* 12.

72. If a Clerk's Salary be 73l. a Year what is that *per* Day? *Anf.* 4s.

73. *A* hath an Eftate of 53 *per Annum,* and payeth 5s. 10d. to the Subfidy, what muft *B* pay, whofe Eftate is worth 100l. per *Annum* ? *Anf.* 11s. $\frac{4}{53}$.

74. If I buy 100 Yards of Ribband at 3 Yards for a Shilling, and 100 more at 2 Yards for a Shilling, and fet it at the Rate of 5 Yards for 2 Shillings, whether do I get or lofe, and how much ? *Anf. Lofe* 3s. 4d.

75. What is the Value of $\frac{5}{8}$ of 20s ? *Anf* 12s. 6d.

76. What Number is that, from which if you take $\frac{1}{5}$, the remainder will be $\frac{1}{8}$? *Anf.* $\frac{20}{48}$.

77. My Purfe and Money, quoth *Dick,* are worth 12s. 8d. but the Money is worth 7 of the Purfe, pray what was there in it ? *Anf.* 11. 1d.

78. What Number is that which maketh 9 to be the $\frac{2}{3}$ of it ? *Anf.* 13 $\frac{1}{2}$.

79. A Maltfter has feveral Sorts of Malt, one at 4s. 6d. another at 4s. and a third at 3s. 6d. a Bufhel ; to mix an equal Quantity of each, what muft be the Price of a Bufhel ? *Anf.* 4s.

80. A Farmer is willing to make a Mixture of Rye at 4s. a Bufhel, Barley, at 3s. and Oats at 2s. how much muft he take of each to fell it at 2s. 6d. the Bufhel ? *Anf.* 6 *of Rye,* 6 *of Barley, and* 24 *of Oats.*

81. If $\frac{3}{8}$ of a Ship be worth 3740*l*. what is the Worth of the whole? *Anf.* 9973*l*. 6*s*. 8*d*.

82. A Person said he had 20 Children, and that it happened there was a Year and a Half between each of their Ages, his eldest was born when he was 24 Years old, and the Age of his youngest is now one and twenty, what was the Father's Age? *Arf.* 73 $\frac{1}{2}$ Years.

83. Bought a Cask of Wine for 62*l*. 8*s*. how many Gallons were in the same, when a Gallon was valued at 5*s*. 4*d*. *Anfw.* 234.

84. *A* owes *B* 296*l*. 17*s*. but he compounds for 7*s*. 6*d*. in the Pound, what must *B* receive for his Debt?
Anfw. 111*l*. 6*s*. 4*d*. $\frac{1}{2}$.

85. How many Dozens of Stockings at 11 Groats *per* Pair, may I buy for 190*l*. 12*s*. *Anfw.* 86 *Doz*. 7 *Pair* $\frac{28}{44}$.

86. A Sheepfold was robbed three Nights succeffively; the firft Night half the Sheep were ftolen, and half a Sheep more; the fecond Night half of the Remainder were loft, and half a Sheep more; the laft Night they took half what were left, and half a Sheep more; by which Time they were reduced to 20; how many were they at firft? *Anfw.* 167.

87. The Spectator's Club of fat People, tho' it confifted but of 15 Perfons, is faid to weigh no lefs than 3 Tons, how much, at an Equality was that *per* Man? *Anfw.* 4 *cwt*.

88. A merry young Fellow in a fmall Time got the better of $\frac{1}{2}$ of his Fortune; by Advice of his Friends, he then gave 2200*l*. for an Exempt's Place in the Guards; his Profufion continued till he had no more than 880 Guineas left, which he found by Computation was juft $\frac{3}{20}$ Part of his Money after the Commiffion was bought, pray what was his Fortune at firft? *Anfw.* 10450*l*.

89. *A* owes *B* 395*l*. 18*s*. but compounds the whole Debt for 100*l*. 12*s*. what is that in the Pound? *Anfw.* 5*s*. 1*d*. *nearly*.

90. How many Dollars, at 4*s*. 4*d*. each muft be given for 360 Guilders, at 2*s*. 2*d*. each? *Anfw.* 180.

91. Four Men have a Sum of Money to be divided amongft them in fuch a Manner, that the firft fhall have $\frac{1}{3}$ of it, the fecond $\frac{1}{4}$, the third $\frac{1}{5}$, and the fourth the Remainder, which is 28, what was the Sum? *Anf.* 112*l*.

92. What is the Amount of 1000*l*. for 5 Years $\frac{1}{2}$, at 4$\frac{3}{4}$ *per Cent*. Simple Intereft? *Anf.* 1261*l*. 5*s*.

93. Sold Goods amounting to the Value of 700*l*. for two 4 Months, what is the prefent Worth, at 5 *per. Cent*. Simple Intereft? *Anfw.* 682*l*. 19*s*. 5*d*. 2 *qrs*.

94. A Room is 30 Foot long, and 18 Foot wide, is to be covered with painted Cloth, how many Yards of ¾ wide will cover it ? *Answ.* 80 *Yards.*

95. There are two Numbers, the one 48, the other twice as much, what is the Difference between their Sum and Difference ? *Answ.* 96.

96. *Hetty* told her Brother *George*, that tho' her Fortune on her Marriage took 19312*l.* out of the Family, it was but ⅕ of two Years Rent, Heaven be praised! of his yearly Income, pray what was that ? *Answ.* 16093*l.* 6*s.* 8*d. a Year.*

97. There are two Numbers, the one 25, the other the Square of 25, I demand the Square Root of the Sum of their Squares ? *Answ.* 625,4998.

98. Says *A* to *B*, if I had 4 of your Sheep, I should have as many as you, and says *B* to *A*, if I had 4 of yours, I should have twice as many as you ; how many had each ? *Answ.* A 20, B 28.

99. *A*, *B* and *C* trading together gained 120*l.* which is to be shared according to each Man's Stock ; *A* put in 140*l.* *B* 300*l.* and *C* 160*l.* what is each Man's Share ?
    Answ. A 28, B 60, C 32.

100. A Gentleman having 50*s.* to pay among his Labourers for a Day's Work, would give to every Boy 6*d.* to every Woman 8*d.* and to every Man 16*d.* the Number of Boys, Women and Men, was the same, I demand the Number of each ? *Answ.* 20 *of each Sort.*

101. There are three Numbers, 17, 19, and 48, I demand the Difference between the Sum of the Squares of the first and last, and the Cube of the middlemost ? *Ans.* 4266.

102. A Stone that measures 4 Feet 6 Inches long, 2 Feet 9 Inches broad, and 3 Feet 4 Inches deep, how many solid Feet doth it contain ? *Answ.* 41 *Feet 3 Inches.*

103. What does the whole Pay of a Man of War's Crew of 640 Sailors amount to for 32 Month's Service, each Man's Pay being 22*s.* 6*d. per* Month. *Ans.* 23040*l.*

104. If I have an Estate of 470*l. per Annum,* what may I expend daily, and yet lay up 130*l. per Annum.*
    Ans. 18*s.* 7*d.* $\frac{1}{2}$ $\frac{90}{365}$.

105. What Number is that, which being divided by 19, the Quotient will be 72. *Ans.* 1368.

106. Reduce 13 ½ Bushels of Coals to the Fraction of a Chaldron ? *Facit* ⅜.

107. Bought 28 *qrs.* 2 *Bushels* of Wheat at 4*s.* 6*d. per* Bushel, what does it come to ? *Ans.* 50*l.* 17*s.*

108.

108. How many Pounds of Coffee at 5s. 9d. *per lb.* is equal in Value to 426*lb.* of Tea at 13s. 4d. *per lb.* ? *Ans.* 687 $\frac{57}{69}$.

109. What is the Value of 27 *Dozen* 10*l.* of Candles at 5d. *per lb* ? *Anf.* 6*l.* 19s. 2d.

110. A Traveller would change 500 *French* Crowns at 4s. 6d. *per* Crown into *Sterling* Money, but he muft pay a halfpenny *per* Crown for Change, how much muft he receive ? *Anf.* 111*l.* 9s. 2d.

111. There are two Numbers, the one 63, the other half as much, I demand the Product of their Squares, and the Difference of their Product and Sum ?

Anf. Product of the Squares 3938240.5, *Difference* 1890.

112. *A* and *B* traded together and gained 100*l. A* put in 640*l. B* put in fo much, that he muft receive 60*l.* of the Gain. I demand how much *B* put in ? *Anf.* 960.

113. Of what Principal Sum did 20*l.* Intereft arife in 1 Year, at the Rate of 5 *per Cent. per Annum* ? *Anf.* 400*l.*

114. Having bought 40 Yards of Cloth, at 8s *per* Yard, and 70 Yards at 12s. what is the Value of both Pieces ?
Anf. 58*l.*

115. Two Men depart both from one Place, the one goes North, and the other South ; the one goes 7 Miles a Day, and the other 11 Miles a Day ; how far are they diftant the 12th Day of their Departure ? *Anf.* 216 Miles.

116. In 672 *Spanifh* Guilders, how many *French* Piftoles at 17s. 6d. *per* Piece ? *Anf.* 76. $\frac{38}{35}$.

117. In 7 Cheefe, each weighing 1cwt. 2 qrs. 5*lb.* how many Allowances for Seamen may be cut, each weighing 5 Oz. 7 Drams ? *Anf.* 3563 $\frac{11}{23}$.

118. If 48 taken from 120 leave 72, and 72 taken from 91 leave 19, and 7 taken from thence leave 12, what Number is that, out of which, when you have taken 48, 72, 19 and 7, leaves 12 ? *Anf.* 158.

119. A Father ignorant in Numbers, ordered 500*l.* to be divided among his five Sons thus : Give *A*, fays he, $\frac{1}{3}$, *B* $\frac{1}{4}$, *C* $\frac{1}{5}$, *D* $\frac{1}{6}$, and *E* $\frac{1}{7}$ Part, divide this equitably among them, according to the Father's Intention. *Anf.* *A* 152 $\frac{1392}{2734}$, *B* 114 $\frac{1044}{2734}$, *C* 91 $\frac{1386}{2734}$, *D* 76 $\frac{696}{2734}$, and *E* 65 $\frac{990}{2734}$.

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